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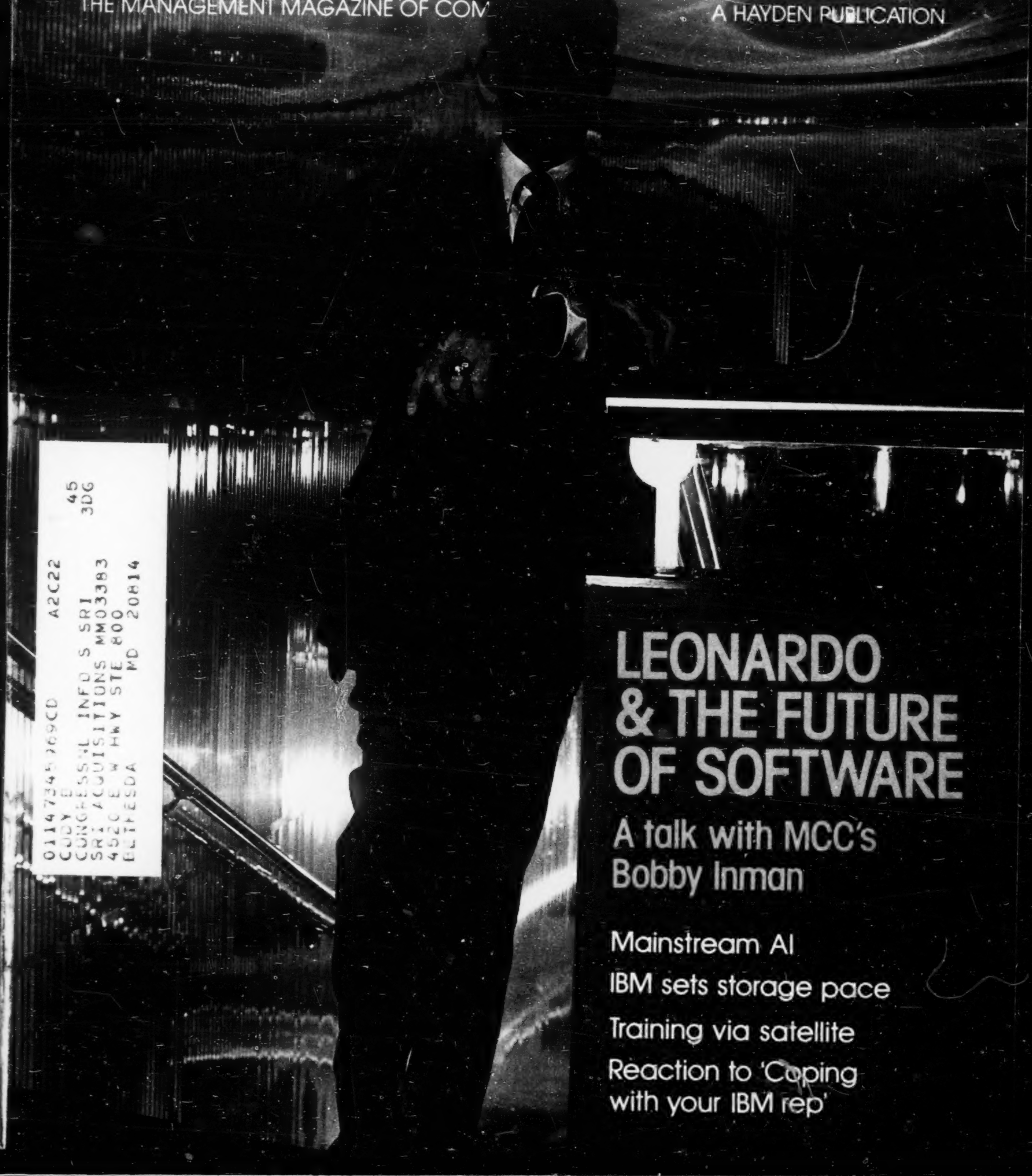

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LEONARDO & THE FUTURE OF SOFTWARE

A talk with MCC's Bobby Inman

Mainstream AI

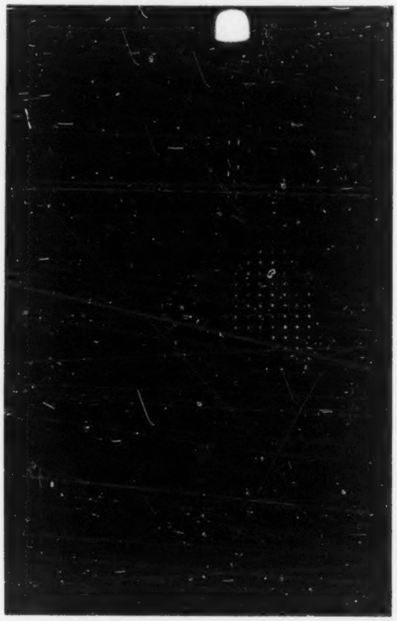
IBM sets storage pace

Training via satellite

Reaction to 'Coping with your IBM rep'

COMPUTER DECISIONS

December 3, 1985 Volume 17 Number 24 Copies printed: 181,871



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COVER PHOTO: Zigy Kaluzny

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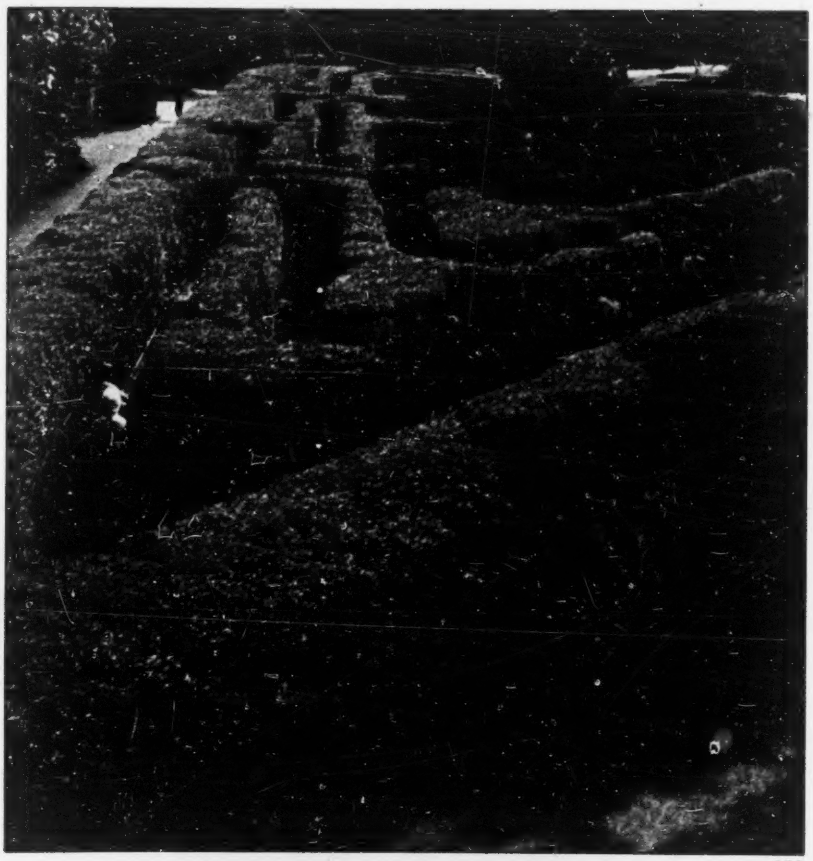

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by a plug-compatible vendor. Up to now, only IBM's 3084s and the announced-but-not-delivered 3090/400 featured four coupled cpus in a single processor complex.

Amdahl also announced enhancements to current 580 processors, including enlarged main memory capacity and improvements in channel configurations. Maximum memory on the 5840, 5850, 5860, 5867, and 5870 processors has been increased from 64 Mbytes to 128 Mbytes. New options for the 5868 and 5880 processors include a 40-channel configuration, an alternative to the 32- and 48-channel configurations already available. In addition, users with two 5850 processors can now couple them to form one 5868 processor.

—*Michael Dobberstein*

DEMAND GROWS FOR SYSTEMS ANALYSTS

The demand for programmers is levelling off, but the need for systems analysts is burgeoning, according to third-quarter statistics from the U.S. Bureau of Labor Statistics in Washington.

According to the bureau's estimates, 553,000 programmers are employed in the United States, only 1 percent more than in the third quarter of 1984 and 14 percent more than in 1983. In contrast, the bureau estimates that 394,000 workers are employed as systems analysts, up 39 percent over 1984 and 22 percent over 1983.

Experts say organizations are emphasizing system design and application rather than straight coding skills. "The coding, debugging, and testing skills of a programmer are pretty much obsolete right now," says Elias Awad. Awad is chairman of the special interest group on computer personnel research for the Association for Computing Machinery, New York, and a teacher at the McIntire School of Commerce at the University of Virginia, Charlottesville.

Nonprocedural fourth-generation languages have both increased the productivity of programmers and extended programming capabilities to end users. The result is "a steady de-emphasis on coding," Awad says. "Organizations' commitments to Cobol explain why there's still a demand for programmers, but programmers are needed only for documentation and maintenance of existing systems," he says.

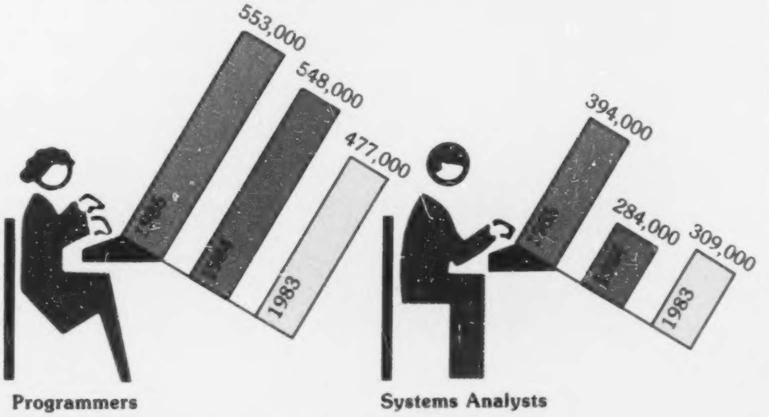
Rather than spend money on new programs, corporations are trying to optimize the use of their existing systems, says Leslie Epstein of The Omni Group Ltd., an office automation consultancy in New York. "Organizations are stopping to look at their systems and exploit what they have," she says. "They're planning a little more, and not programming on request." Organizations need analysts because they "can work through the life cycle of a project, from its definition to end-user training," Awad says.

Also, analysts are better able than programmers to find and develop applications for an organization's existing systems, says Tom Davenport, director of the Prism research service for Index Systems Inc., a dp and management consultancy in Cambridge, MA. Analysts can decide what can be done with a system, and how, but programmers only execute their assignments, Davenport says. "Analysts can see how the data flow in and out of an organization's departments, and design a system to deliver exactly that," says Awad.

Computer systems analysts and programmers are the only two types of data-processing professionals the Bureau of Labor Statistics tracks by title. The bureau's numbers represent the average number of professionals employed during the preceding 12 months.

A word of caution about the bureau's numbers: They are extrapolated from a sample of only 60,000 households. A bureau spokesman admits the figures "jump around a bit" (see chart) because of the relatively small size of the sample. But, he says, general trends can be spotted over a period of years. ☐

DP STAFFING TRENDS



Third quarter count from the U.S. Bureau of Labor Statistics.

Chart by Denise Barbieri

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IN SEARCH OF AI MICRO SOFTWARE

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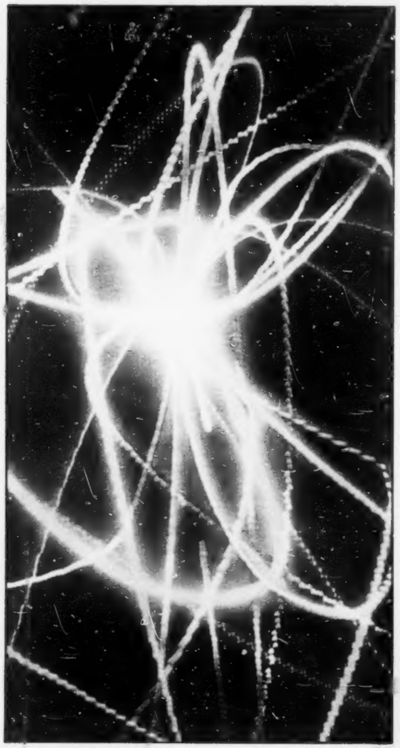

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COVER PHOTO: Norman Snyder

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LOADING UP FOR THE LONG HAUL

When you commit to one of the new high-horsepower mainframes, you're also buying into a vendor's strategy.

by Lee Keough, Industry Editor

When IBM introduces a new mainframe series, as it did this year with the 3090 "Sierra" line, it causes a domino effect in the computer industry. Other mainframe vendors, faced with even greater domination by IBM, unveiled new top-of-the-line products in an effort to offset the impact of the Sierra introduction.

With this year's announcements, users have more options than ever. IBM alone sells three mainframe lines—the 3090, the 308X, and the 43XX, although the latter is typically considered a supermini series. The two Japanese-backed plug-compatible vendors, National Advanced Systems Inc., Mountain View, CA, and Amdahl Corp., Sunnyvale, CA, introduced their versions of the 3090. Two long-time IBM competitors, Burroughs Corp., Detroit, and Honeywell Inc., Minneapolis, also unveiled new mainframe lines, primarily to prevent customer defections to IBM.

As mainframe options increase, purchasing decisions become more difficult. In most cases, corporations that decide to buy into the latest generation of mainframes are not only buying a piece of hardware, they are also making a long-term commitment to a vendor and its philosophy. "It's like a merry-go-round," says Edward Wagner, president of Applied Management Services, a Patchogue, NY, consultancy. "It's a financial as well as a technical issue—and a big concern."

One of the biggest questions facing MIS/dp executives is whether IBM's 308X series is obsolete. Until the unveiling of Sierra, the 3084QX, the top model in the 308X line, was considered the foremost general purpose computer. On the surface, the Sierra line doesn't offer much more than the 3084QX. The 3090/200—the only available model in the Sierra line—offers the ability to process 28 million instructions per second (MIPS), not much more power than the 3084QX, which operates at 27 MIPS. The 3090/200 costs $5 million, about twice the cost of a used 3084QX.

But migrating to Sierra offers users many advantages, the most important being that the line will be the premier family of IBM processors for the next four or five years. Users who stay with the 308X series may be left behind because their machines are not upgradeable to 3090s.

"The 3080 is a good machine that has served users well, but if you're planning for the future, it is very much dead," says Tom Henkel, a senior market analyst with the Yankee Group, the Boston-based market researchers.

International Data Corp. (IDC), the Framingham, MA-based market-re-

SPERRY
IBM
Burroughs
IBM
Honeywell

Photo by Bob Ward

search house, says user MIPS demand is growing at an annual rate of 30 percent. For users with voracious power appetites, the 3090 family or comparable plug-compatible equipment is the only way to go. The 3090/400, which has been announced but will not be available until the fourth quarter of next year, is rated at 50 MIPS.

The 3090 machines pack all this power in half the space of the 308X series. The smaller footprint is possible because the 3090's chips, which use emitter-coupled logic, are jammed into liquid-cooled packaging. The cooling system allows the high-speed processing of emitter-coupled-logic chips without a meltdown.

Despite his contention that 308X machines don't have a bright future, Henkel says it would make sense for current 308X users to migrate through that series rather than switch to Sierra immediately. He adds that users should buy upgrades on the used market. "You'd be crazy to buy from IBM," he contends.

However, corporations looking to upgrade from 303X or 43XX processors may be wise to bypass the 308X series entirely and move right into the 3090 line, analysts say. The 3090/200 is actually two tightly coupled 15-MIPS processors; analysts agree that the next member of the Sierra family probably will be a single-processor 3090. Analysts expect a 15-MIPS to 17-MIPS 3090 uniprocessor to appear as early as the first quarter of next year.

"Just the intimation of the 3090 uniprocessor has depressed the price of the 3080," says Edward Wagner. Henkel adds that as soon as IBM comes out with the 3090 uniprocessor, "the 3080 will be deader than it is now."

Jumping directly to the 3090 family will offer current 303X and 43XX users more advantages than just a clear path to high-range computing power. The expanded storage offered by the 3090 series not only provides greater main storage, but it also allows faster transaction rates, which will significantly improve processor performance.

Analysts believe IBM may be putting features into the 3090 that will be revealed to the public later. Frederic Withington, an analyst with Arthur D. Little Inc., a Cambridge, MA-based management consultancy, predicts IBM will expand the use of special processors serving as adjuncts to the central processing unit (cpu). IBM has already announced a vector-processing capability for Sierra, and Withington says more such announcements should follow as the product line matures.

"There will be movement away from

the large, monolithic central processor, toward a more modular system," says Wagner. Wagner and other observers believe instructions have been written into the 3090's memory chips that will enable users to offload components of the MVS/XA operating system into support processors. Offloading will significantly reduce the power needed to support the operating system.

The speculation over which features may be hidden in the 3090 series is fueled by past practices. IBM has released processors containing unannounced capabilities in the past. For instance, IBM did not immediately announce the extended architecture (XA) feature in the 308X series. But even without hidden features, it is clear the 3090 is superior to the 308X in every way but price.

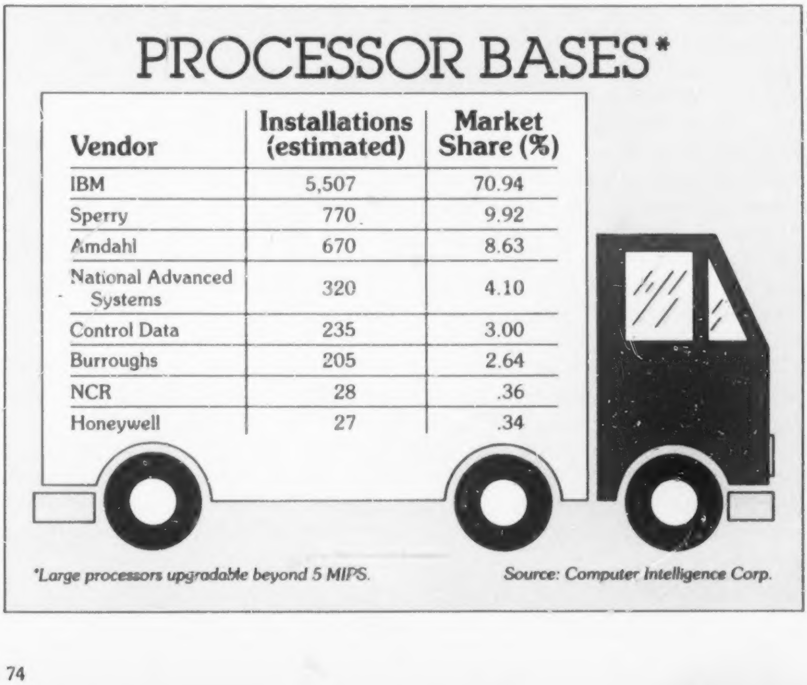
Whether the Sierra is better than its plug-compatible imitations is another question. "Both the Amdahl and NAS machines look like competitive products on paper," says Francis Gens, the IBM-watcher for IDC. "The only curve IBM has thrown at them so far is the vector-processing capability."

NAS was the first to announce a competitor to Sierra, with its AX/SL 60 and AX/SL 80 processors, manufactured in Japan by Hitachi Ltd. The AX/SL 60 is a uniprocessor, but at 28 MIPS it offers about the same power as the 3090/200. The NAS machine costs $4.8 million, slightly less than the IBM model. In addition to being smaller, the AX/SL 60 is air-cooled, relieving customers of the burden of maintaining a liquid-cooled system. At 50 MIPS, NAS' AX/SL 80 rivals the power of IBM's 3090/400.

> "By the second quarter of 1986, IBM will have delivered all the 3090/200s anyone wants."
>
> *West, Comdisco*

Amdahl took longer to announce its latest mainframe offering, the Apache series. Amdahl designed its series with components made by the Japanese giant Fujitsu Ltd. Amdahl says Apache will be available in three different configurations, but only one version, the mid-range 5890 Model 300, will be shipped in the near future. Amdahl says its mid-range model will be available in the second quarter of next year, the 200 and the 600, will not be shipped until 1987.

PROCESSOR BASES*



Vendor	Installations (estimated)	Market Share (%)
IBM	5,507	70.94
Sperry	770	9.92
Amdahl	670	8.63
National Advanced Systems	320	4.10
Control Data	235	3.00
Burroughs	205	2.64
NCR	28	.36
Honeywell	27	.34

**Large processors upgradable beyond 5 MIPS.*

Source: Computer Intelligence Corp.

Chart by Vincent J. Gallo

Amdahl's 5890 Model 300 offers greater processing power—36 MIPS to 38 MIPS—than IBM's 3090/200 for the same price. Amdahl is also touting Apache's "multiple domain" feature as an advantage over Sierra. The multiple domain facility is a hardware feature that lets Apache users run a number of operating systems on one machine without using IBM's Virtual Machine (VM) operating system as a foundation, as is required with IBM mainframes. VM allows a mainframe to run under other operating systems, thereby partitioning the machine for different applications, but it is expensive and drains processing power.

IDC's Gens believes Amdahl's advantage over IBM may be short-lived. The Start Interpretive Execution (SIE) assist, a hardware feature introduced by IBM with the 3090, allows more efficient use of VM. When coupled with the VM/XA migration aid, SIE assist reduces the power needed by VM to partition under other operating systems. Although the IBM scheme still uses more power than Amdahl's multiple domain system, Gens believes Amdahl will eventually lose this advantage. SIE assist is also available for 308X machines.

The two chief considerations for mainframe buyers are compatibility with IBM operating systems and performance reliability. IBM has a real or perceived advantage in both, says Gens. But at this stage of a mainframe cycle, a third factor—availability—also carries great importance.

Russell West, vice president of strategic planning for Comdisco Inc., a large lessor and used-computer dealer based in Rosemont, IL, says plug-compatible vendors once had the advantage of being able to deliver a product faster than IBM could. Since the release of IBM's 3090/200, this claim is no longer true. "By the second quarter of 1986, IBM will have delivered all the 3090/200s anyone wants," he says. Although NAS could regain the availability edge if it ships its 50-MIPS AX/SL 80 as planned next spring, Amdahl is falling behind IBM's delivery dates with its Apache line. "All of a sudden, IBM can deliver and Amdahl can't," says West.

(Continued on page 76)

CHOICES TO GET TOUGHER

It's not going to get any simpler for MIS/dp directors to weed through mainframe offerings. Industry observers expect the market to become even more complicated, with distinctions between product lines blurring as vendors continue to release smaller and more powerful machines.

By the end of next year, users looking for an IBM mainframe that processes about 7.5 million instructions per second (MIPS) will probably be able to choose from three different product lines, says Russell West, vice president of strategic planning for Comdisco Inc., a Rosemont, IL, used-computer dealer. Currently, IBM offers only one mainframe—the 3083 uniprocessor—that operates at 7.5 MIPS. West predicts IBM will announce a 7.5-MIPS processor in the 4300 series in the first quarter of next year. He also expects IBM to offer a uniprocessor rated at 8 MIPS to 10 MIPS within the 3090 line by the end of next year.

(Continued from page 74)

For Morgan Stanley & Co., the New York-based investment bankers, early product delivery plays a central role in purchasing decisions. Morgan Stanley's data center supports 1,500 employees, primarily stock brokers, who need subsecond mainframe response times. Joel Nachmann, manager of hardware planning for Morgan Stanley, says the corporation added three 3090/200s to the five NAS 9080 mainframes in its data center to meet growing processing needs. Nachmann, a satisfied NAS customer, is currently considering the purchase of another mainframe, this time a 50-MIPS processor. He says he plans to buy an AX/SL 80 from NAS. "Not only is there a significant financial advantage, but we can get it three to six months earlier than a 3090/400," he says. "Also, there is an unbelievable environmental [cost] advantage." The NAS AX/SL 80 is about half the size of a 3090/400. For Morgan Stanley, located in New York's crowded financial district, the subsequently reduced cost of floor space, power, and air conditioning is significant.

Regardless of benefits offered by plug-compatible machines, some users will buy only from IBM. Wagner of Applied Management Services says "fear, uncertainty, and doubt" about buying from other vendors is increasing. "With the rapid pace of technology, users are becoming more and more concerned they will be left out in the cold," he says. "It's no longer the path of least resistance, or a philosophical issue." Wagner says the stakes are getting higher for equipment buyers. "You can't view it as just buying a cpu anymore," he says. "Users are buying networks. They are making $5 million to $20 million investments and setting the direction of their shops for years to come."

Ron Kriegel, manager of resource management for the State of Illinois data center, agrees. Kriegel is a satisfied Amdahl customer; his center has Amdahl 5860s and IBM 308Xs. But Kriegel is awaiting the installation of a 3090/200, and he thinks his next purchase may also be an IBM processor. Kriegel worries that IBM is making it more difficult for plug-compatible vendors to match IBM performance through reverse engineering by embedding more of its operating system in the hardware's memory chips, or microcode. "I'm not going to commit millions of dollars without knowing if the plug-compatibles can keep up," he says.

Although Joel Nachmann agrees that IBM is making it more difficult for plug-compatible vendors to keep up, he will continue to buy plug-compatible machines. Nachmann says he will judge products based on what is currently available, not what is rumored for the future. Besides, he says, "for IBM to introduce a revolutionary change is contrary to its marketing strategy. The day you have to discard everything is the day IBM lets all of its competitors back in the door."

> One question facing MIS/dp is whether IBM's 308X series is obsolete.

Comdisco's West says plug-compatibles face a crunch not only because IBM is making it difficult to mimic its processors, but also because it is closing the gap on pricing. Plug-compatible vendors may find it tough to devote the necessary funds for research and development and keep their prices significantly lower than IBM's, he says.

The slimmer price differentials between plug-compatible mainframes and equivalent IBM machines becomes magnified in lease rates. West says users who obtain the NAS AX/SL 60 from Comdisco will pay $117,000 a month on a four-year lease, and $105,300 for an IBM 3090/200. West says that although Amdahl's new mainframe is not the 3090/200's equivalent, its lease rates will be similarly high.

Plug-compatible machines have higher lease rates because Comdisco has greater confidence in the residual value of IBM mainframes, says West. He cites the greater proportion of financing for IBM mainframes as another reason for higher plug-compatible rates. Although Comdisco handles very few deals for plug-compatible vendors, West claims lease rates don't vary much among third-party lessors. He admits, however, that a user may obtain a better deal by financing a lease through a plug-compatible vendor.

Although NAS has yet to announce its lease rates for the NAS AX/SL 60, a spokesman says its leasing rates will be competitive with those for the IBM 3090/200. Nevertheless, since Comdisco estimates 80 percent of users lease rather than purchase mainframes, it won't bode well for plug-compatible vendors if the financial advantage to leasing a plug-compatible mainframe is only marginal.

Although many analysts say plug-compatible vendors will find it tougher to meet IBM head on in the future, these vendors are not in serious danger. "They constantly have to walk that tightrope," says Gens, "but I think the plug-compatibles are in pretty good shape for this mainframe generation."

The squeeze will come, says Gens, with Summit, IBM's next generation mainframe. Summit's introduction is expected as early as 1988. Gens speculates that Summit could be the first truly programmable mainframe processor, meaning users will be able to change the processor's dedication easily to optimize the running of specific applications.

Where does all this activity in the IBM market leave other mainframe vendors? At the moment, no worse off than before, say analysts. Most of "the Bunch" vendors—Burroughs, Univac (now Sperry Corp., Blue Bell, PA), NCR Corp. (Dayton, OH), Control Data Corp. (Minneapolis), and Honeywell, the five largest mainframe makers after IBM—are offering mainframe models intended to prevent current customers from switching to IBM.

Burroughs' new line of large processors, the A 15 series, offers the same performance as the IBM 3090. Computer Intelligence Corp., a market researcher based in La Jolla, CA, estimates the A 15 series will provide power ranging from 17 MIPS to 59 MIPS. Burroughs is trying to attract new users at the low end of its mainframe line, the A 3 series, to the new machine and is trying to interest third-party software houses in designing applications for its machines. In addition, Burroughs mainframes now provide gateways to Systems Network Architecture (SNA), IBM's mainframe communications scheme.

Sperry also supports SNA, but it is banking on Bell Labs' Unix operating system to increase its market share. Sperry's mainframes, the 1100/70 and 1100/90, operate at 1 MIPS to 26 MIPS and run under Unix. Jan Brundin, vice president of product strategy, says Sperry is positioned for "the emerging Unix market," which he says will grow as MIS/dp becomes more involved with factory operations.

Honeywell attempted to differentiate itself from the pack this year by offering a mainframe series that can perform array processing on a mainframe manufactured by the Japanese giant NEC. The DPS/90 mainframe gives users the ability to perform general data-processing functions and scientific and engineering calculations on the same machine. However, the initial interest sparked by the Honeywell offering was muted when IBM introduced vector-processing for the 3090.

NCR and Control Data have a different set of problems from the other "Bunch" vendors. Although NCR has a loyal user base of banks and retailers, its most powerful machine is rated at only 7.5 MIPS. Control Data's financial troubles, which analysts blame on the vendor's peripherals and noncomputer businesses, continue to worsen. Although a spokesperson says Control Data is refocusing its efforts on the computer business, the vendor has been forced to close plants, lay off workers, and put a subsidiary up for sale. Control Data's mainframe offering, the Cyber 180, is geared to the scientific, education, and government markets.

IDC's Gens says new offerings may help "The Bunch" vendors keep their existing customer bases, but that's about all. Providing gateways to IBM mainframes is necessary, says Gens, but relaxing proprietary reins can be dangerous. Although IBM gateways could keep some users happy, they will make it easier to defect to IBM, he notes.

Gens believes the biggest competition IBM's Sierra line faces is used equipment from older IBM lines. "The future of the IBM market is in the IBM world," he says. West of Comdisco, as might be expected, agrees. He describes the used IBM mainframe market as the wake following the boat. "In the past, users bought from plug-compatibles to have an alternative," says West. "Now the used market is the alternative, simply because IBM is making its products only marginally obsolete."

This year's activity has created a complex mainframe market for users. "Heads are spinning," says Wagner of Applied Management Services. "The MIS/dp executive today has to be a wheeler dealer in the equipment market." ☐

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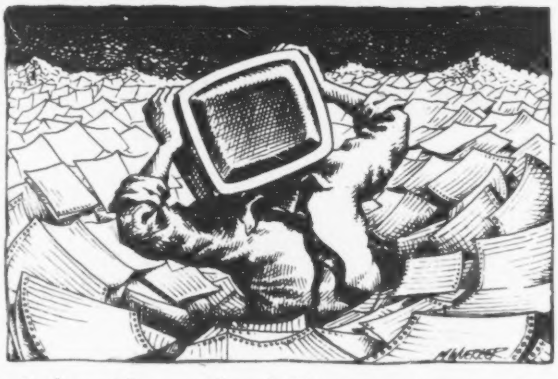

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AVOIDING A 4GL DISASTER

COMPUTER
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COVER PHOTO: Ted Hardin

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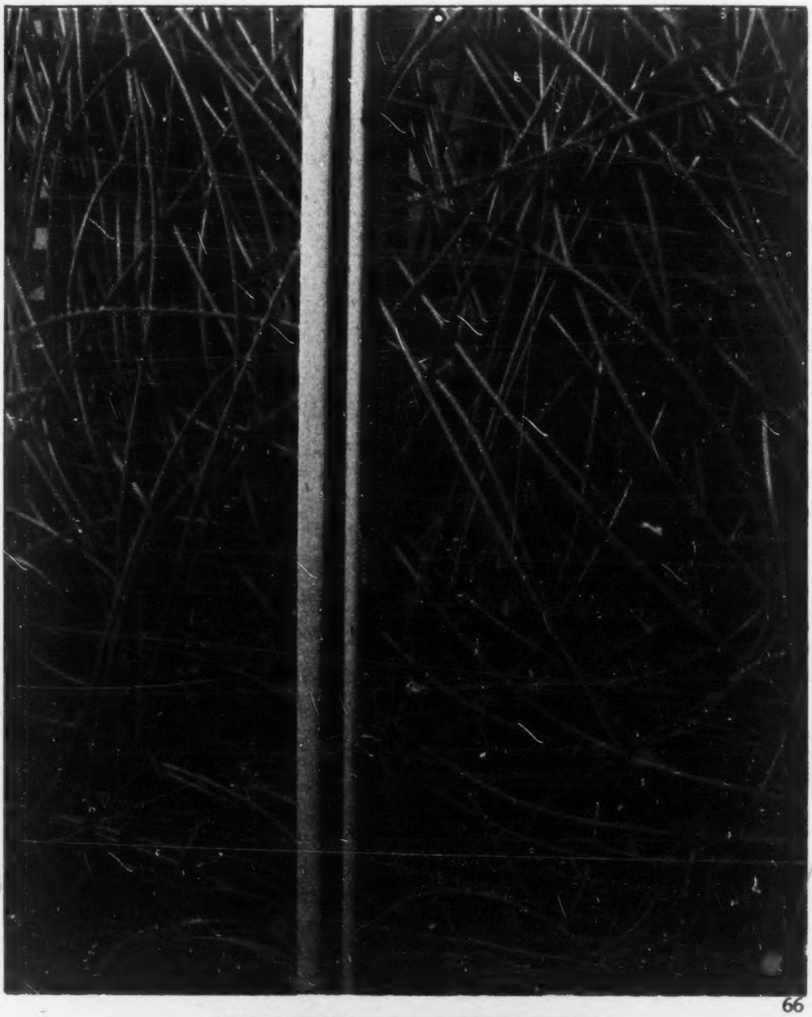

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percent less than the hospital's previous AT&T service contract.

Some users say installation by AT&T goes without a hitch. Jon Shroyer, president of RCA/Sharp Microelectronics Inc., Vancouver, WA, reports that he had no problems with AT&T's service or installation after leasing a used Dimension 400 from CMI for one year with an option to buy. "Right now the facility we have is temporary," explains Shroyer. "We will be in this building for only a little over a year, so leasing used equipment right now is cost-effective."

Many used equipment dealers offer leases so that users aren't stuck with old technology if better products become available. But many corporations buying used equipment like PBXs are opting for older analog switches rather than digital switches, says Glenn Powers. "If a user is content to settle for a piece of dependable telephone equipment, then that user should go ahead and buy used," Powers says. —*Theresa Conlon*

MANAGERS STILL IGNORE VDT HEALTH COMPLAINTS

Management appears to be ignoring the health complaints of video-display terminal (VDT) operators, says Norman Bodek, president of the Data Entry Management Association (DEMA).

Bodek based his comments on DEMA's 1985 VDT Health Survey, which shows that data-entry operators have about the same number of health complaints as they had the previous year. For example, the three most common complaints in the 1985 survey are eyestrain (73 percent), neck and shoulder pain (68 percent), and fatigue (56 percent); in the 1984 survey, the percentages for these categories were 69, 62, and 62, respectively.

The DEMA survey does show that 60 percent of the data-entry managers surveyed made some changes in the office as a result of VDT health concerns. The remedies most applied were reducing indirect lighting and installing antiglare devices on VDT screens.

"It's heartening that some corporate managers are doing something about health concerns," Bodek says, "but 40 percent of the managers aren't, and they'd better become concerned with people's lives in the workplace."

Bodek believe inaction increases the risk that state legislatures will impose work rules governing VDT use. Many such bills that mandate varied work duties or more rest periods are pending. Only about 20 percent of the managers who had made changes in the workplace in response to health complaints used these two remedies, according to the DEMA survey.

Bodek, who used to run Key Universal, a Greenwich, CT-based data-entry service, says he used to think health complaints were imagined by operators or trumped up by unions. But he says the DEMA surveys changed his mind. Bodek suggests corporations will begin to feel the consequences of ignoring the complaints in increased medical costs, especially since so many businesses are self-insured.

DEMA surveyed 480 data-entry operators and their managers at 30 large corporations in the United States. Among the other findings of the survey is that online data-entry operators generally have more health-related complaints than key-to-disk operators. Bodek guesses that working online is more stressful because operators become annoyed waiting for computers to respond to data input, while key-to-disk operators deal with dedicated hosts that have much faster and more consistent response times.

DEMA, based in Stamford, CT, is a professional organization of about 1,500 data-entry managers. ☐

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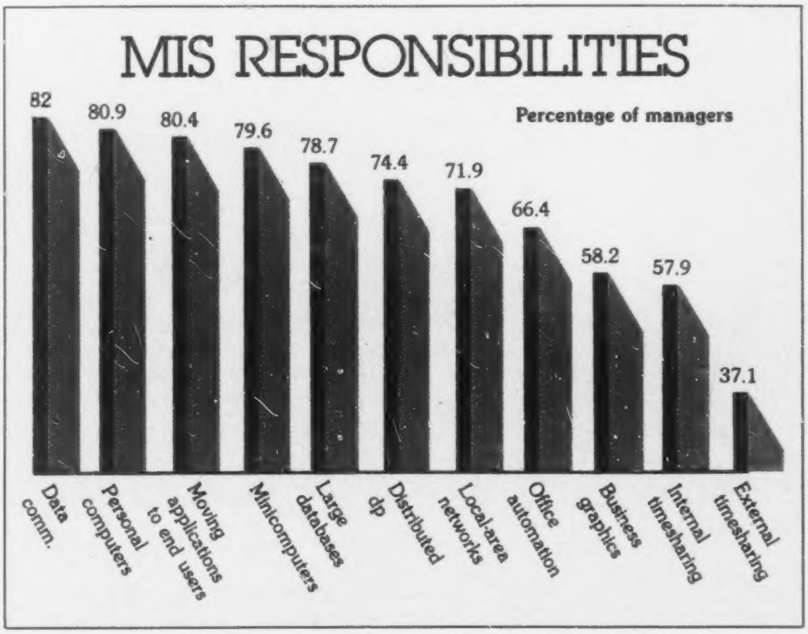

In increasing numbers, MIS/dp managers are concerned with the issues of end-user computing. According to Computer Decisions' annual salary survey of 1,041 MIS/dp managers, more MIS/dp managers are responsible for personal computers (80.9 percent) and for moving applications to end users (80.4 percent) than for large mainframe databases (78.7 percent). ☐

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COMPUTER DECISIONS

MARCH 11, 1986

THE MANAGEMENT MAGAZINE OF COMPUTING

A HAYDEN PUBLICATION

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Volume 18 Number 5

COMPUTER DECISIONS

Copies printed: 181,625

March 11, 1986

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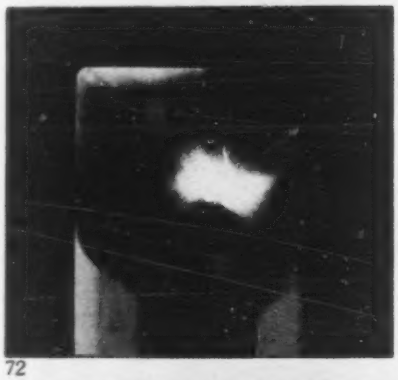

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Cover Photo: Ted Hardin

SALARY SURVEY

MIS/DP BITES THE BENEFITS BULLET

Part I: Salary increases for MIS/dp managers last year were higher than the inflation rate, but many saw their benefits shrink.

by David Roman, Associate Editor

The salaries of senior MIS/dp managers and executives increased at a steady pace last year, but almost a quarter of the managers questioned in *Computer Decisions'* seventh annual Salary Status Survey reported their benefits packages were cut back.

Medical coverage was the most common target for benefits cost-cutting. Many employers are taking the scalpel to health-care costs, which have been climbing at double-digit annual rates. For example, before cost-cutting measures were invoked last year, the medical premiums of Equitable Life Assurance Society, New York, had been increasing by 14 percent annually, according to a member of the carrier's employee benefits staff. "Employers realize that benefits aren't strong contributors to employee satisfaction," says James Carey, president of Carey Associates Inc., a human resources consultancy in San Mateo, CA. The strongest motivator is money, and employers aren't cutting back on wages.

Last year's average 6.5 percent wage increase brought the median salary for all MIS/dp managers to $40,781, according to the survey, which was conducted by Abbott, Langer & Associates. The median salary for top MIS/IS officers increased 8 percent, to $48,771. The median salary for top MIS/dp officers went up 6.5 percent, to $41,741. Last year's rate of salary increase kept pace with the 6.4 percent increase reported in 1984. It also exceeded the yearly rise in the Consumer Price Index, which the U.S. Bureau of Labor Statistics es-

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timates will be about 3.3 percent.

More than 1,300 MIS/dp managers responded to the survey. The typical respondent was 40.5 years old and had 12.8 years of dp experience. Women accounted for 12 percent of the respondents.

Managers of large dp budgets naturally receive higher salaries than managers of smaller budgets. A top MIS/dp officer overseeing a $100,000 annual budget typically earned $28,100 last year; a top MIS/dp officer handling a budget of $10 million or more made almost twice that, or $55,880.

Another obvious factor affecting compensation is an organization's size. A top dp manager in a corporation with fewer than 100 employees made $35,000 last year, while a top dp manager in a corporation with 10,000 to 24,999 employees earned $55,438. Curiously, the median salary for top dp managers stood at $36,000 last year, the same median reported for 1984. The lack of movement may be attributable to differences between respondents in the two surveys. In 1984, 29 percent of the top dp managers surveyed handled dp budgets greater than $1 million. In last year's survey, only 22 percent reported managing budgets greater than $1 million.

It's no surprise that staff size affects compensation rates. Top MIS/dp officers with little or no supervisory responsibility made less than half the median salary for that group last year. Survey data also indicate that the *kind* of staff managed can strongly affect salary level. For example, among top MIS/dp officers who supervise five to nine employees, the median salary for those who exclusively manage technical staffers was 12 percent higher than the median for those who manage a mix of technical and nontechnical workers. A top MIS/dp officer who supervises a staff of 25 or more technical employees made 38 percent more than the overseer of a mixed staff.

The type of organization an MIS/dp manager works for also influences how much he or she makes, according to the survey. MIS/dp managers working for educational institutions and government agencies traditionally earn less than the median salary. Banks, utilities, and manufacturers generally pay the highest salaries.

More MIS/dp managers reported greater job contentment in 1985 than in 1984; almost twice as many selected the highest possible measure of contentment. But 47 percent of the respondents indicated an interest in

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REGIONAL SALARIES

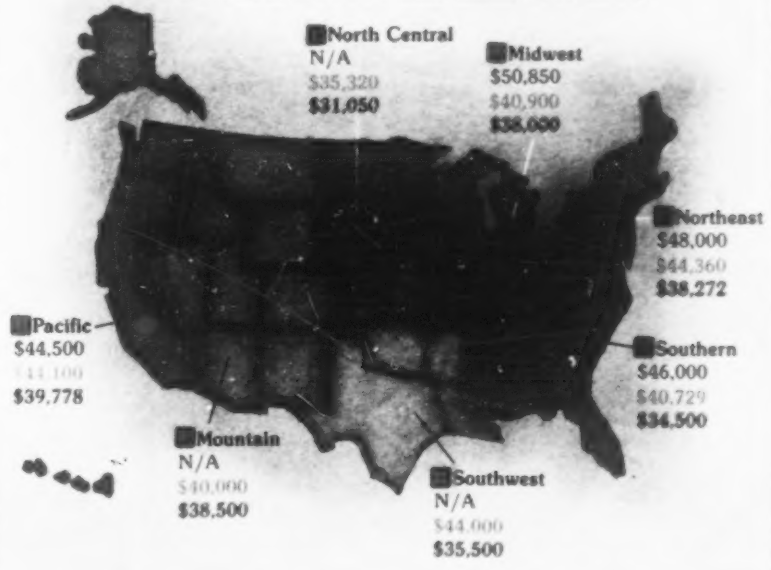


Chart by Denise Barbieri

Overall median salaries

Top MIS/IS Officer:	Top MIS/dp Officer:	Top dp manager:
$48,771	$41,741	$36,000

SALARIES BY INDUSTRY

	Top MIS/IS officer	Top MIS/dp officer	Top dp manager
All manufacturing, processing, extractive	$52,000	$43,000	$35,360
All nonmanufacturing	$48,371	$40,185	$36,377
Banking/financial	N/A	$47,300	$36,980
Chemical/plastic/pharmaceutical mfg.	N/A	$42,500	$39,000
Education	$44,275	$37,759	$35,500
Food/beverage/tobacco mfg.	N/A	$47,000	$40,000
Government	$40,926	$38,188	$37,862
Health services	N/A	$38,500	$33,687
Merchandising	N/A	$40,000	$35,000
Utilities	N/A	$50,848	$50,500

All salaries are median salaries.

(Continued from page 64)

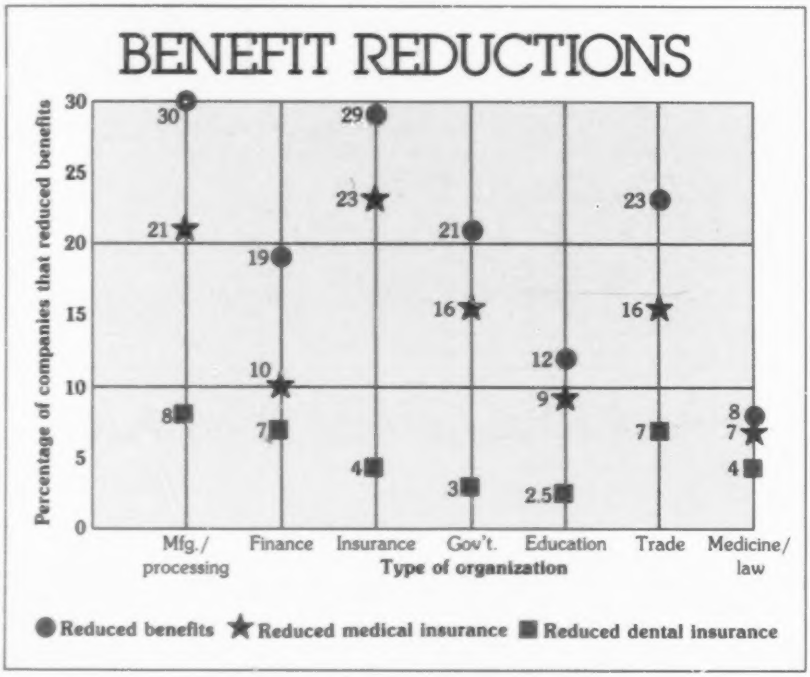
moving out of MIS/dp, a 10 percent increase over the 1984 figure.

If MIS/dp managers are more content, why the urge to move? The answer may lie in the respondents' belief that they have fewer opportunities to advance within their corporations than do other managers in positions of comparable importance. The MIS/dp managers surveyed believe they have less clout in their organizations than other managers. When asked what would motivate them to move to general management, most MIS/dp managers answered challenge or opportunity rather than money.

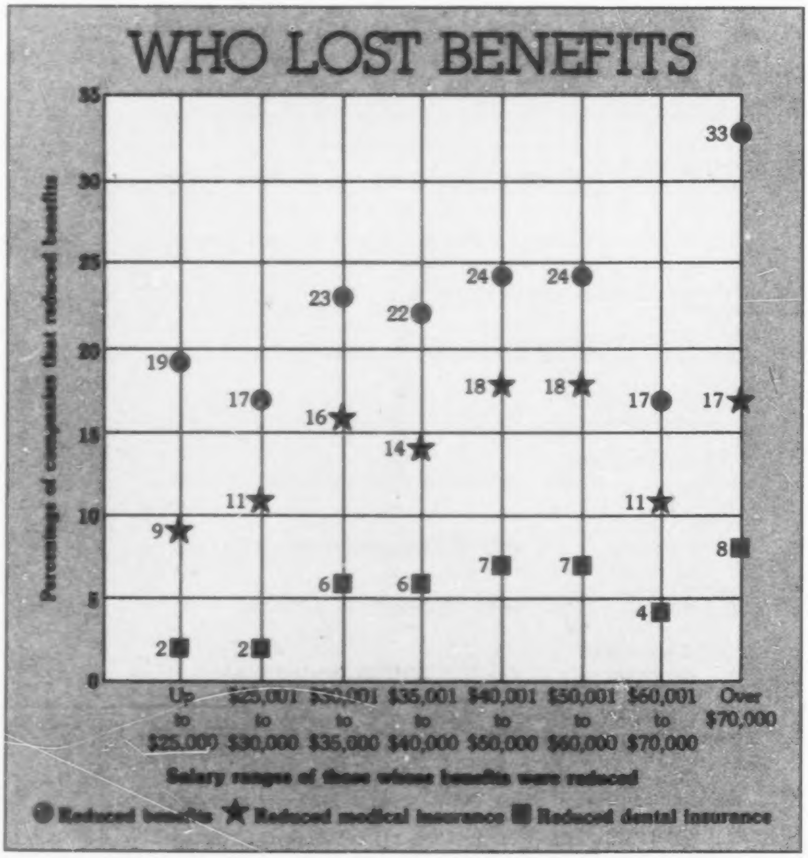
"MIS managers believe they could help their organizations more if they had more responsibility," says Mark Blessing, director of the Compusearch division of Management Recruiters International, a Cleveland recruitment agency. "They've become expert students of their organizations' business, and in many cases have made the difference between their organizations' writing red ink or black ink. They've proven their ability to get results, and now they want more pull."

Like most dp-ers, dp managers love the challenge of their profession, and will change jobs, or employers, to find it. Few profess absolute loyalty to their present employers. Ninety percent of the respondents surveyed said they would change employers if they had the opportunity to earn more money, gain a big bonus, or tackle a new challenge. Of 14 reasons offered for changing employers, improved benefits ranked only 11th.

Some experts contend that most changes in benefits programs should not be called "reductions." Christine Seltz, a consultant with Hewitt Associates, an employee-benefits and compensation consultancy based in Lincolnshire, IL, argues that benefits are not being withdrawn, they're being "managed better." In most cases, employees are given some responsibility to pay or manage their own medical expenses. "The deductible is raised, or if there wasn't a deductible before, one is added," she says. Employees are being encouraged to use outpatient services and facilities when hospi-



BENEFIT REDUCTIONS



WHO LOST BENEFITS

tal stays aren't necessary. "The big automakers used to spend more for employee health-care plans than on the steel they used to make cars," she says. "Organizations had to make an effort to control those costs."

No other portion of a benefits package costs as much as medical care, and no other portions are likely candidates for cutting, says James Carey. "Companies aren't reducing their retirement programs, life insurance, or the amount of vacation time or holidays they offer," he says. Dental programs are often a part of the medical coverage, and are frequently cut back with them.

Carey says an organization that reduces one aspect of its benefits program may also simultaneously introduce less costly improvements in other programs. For example, when the County of Los Angeles reduced holidays by one, paid sick days by two, and began to require workers to pay part of their own medical coverage, it began offering employees a 401(k) deferred compensation program in an attempt to offset anticipated employee dissatisfaction.

Although she likes the new 401(k) program, Marian Solomon, information systems director for the county, says it may not be enough to keep employees on staff. Morale is awful, and turnover is high, she says. The reason? "We didn't get a raise in 1984, and we may not get one in 1986." ☐

Computer Decisions' Salary-Status Survey, conducted by Abbott, Langer & Associates, was mailed to 30,178 managers randomly selected from the magazine's subscription list. An additional 2,765 surveys were mailed to participants in previous surveys and purchasers of previous final survey reports. A two-part questionnaire was mailed. Reported results are based on the 1,311 personal questionnaires and the 1,041 staff-compensation questionnaires that were returned.

Complete results of the survey, published as "Compensation in the MIS/dp Field, 3rd Edition," are available for $250 from Abbott, Langer & Associates, 548 First St., Crete, IL 60417 (312) 672-4200.

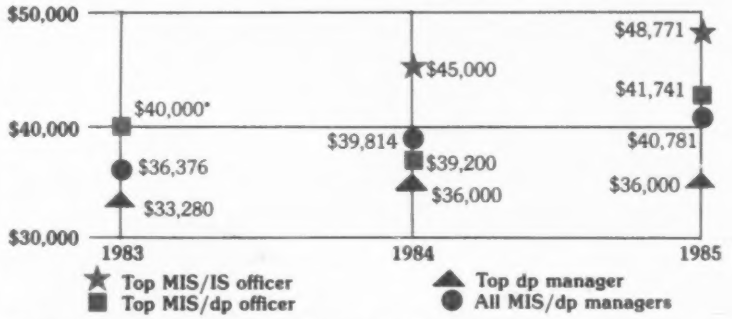
CITY SALARIES

	Detroit	New York	Chicago	Boston	Washington
Top MIS/dp officer	$45,500	$48,990	$44,294	$45,500	$45,340
Top dp manager	N/A	N/A	$40,429	$35,000	$45,520

	Seattle	Atlanta	Indianapolis	Los Angeles
Top MIS/dp officer	$44,100	$43,197	$39,400	$47,000
Top dp manager	$42,000	$40,000	$38,000	$40,680

Chart by Denise Barbieri

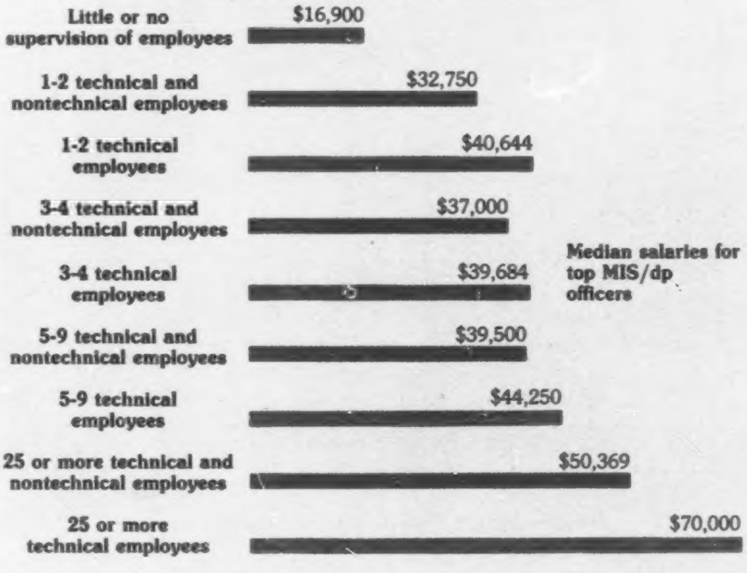
SALARIES OVER 3 YEARS



**Salary data for top MIS/IS officers were not gathered before 1984. This may have inflated the 1983 median salary for the top MIS/dp officer.*

TECHNICAL EDGE

Managers of technical employees earn more



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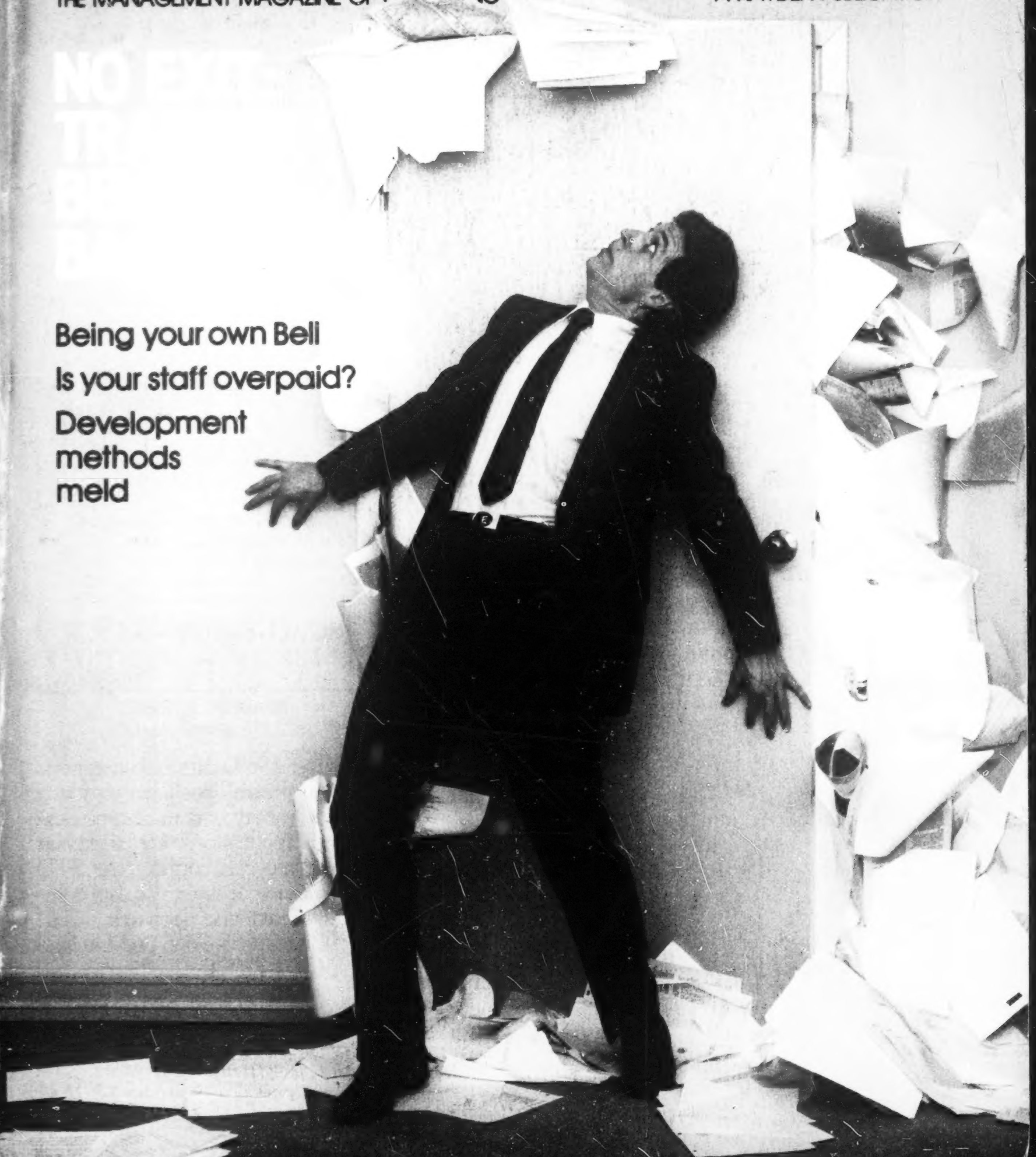

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Being your own Bell

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COMPUTER decisions

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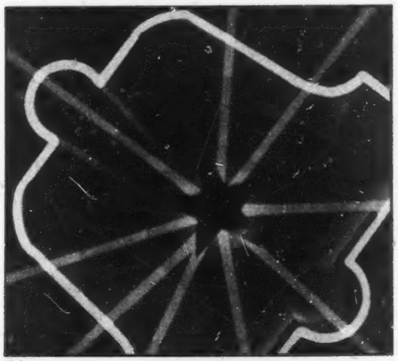

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Cover Photo: Rick Barrick

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STAFF SALARIES

WHERE THE MONEY GOES

Part II: Lower inflation has held down salary increases for staff, but some dp-ers still get special treatment.

by David Roman, Associate Editor

MIS/dp professionals continue to receive annual salary increases that are higher than the rate of inflation. Last year, the typical raise for a dp pro was 7 percent, according to *Computer Decisions'* seventh annual Salary-Status Survey. For most of last year, the rate of inflation was less than 4 percent.

However, as inflation cooled last year, MIS/dp staffers at all levels felt the pinch. Inflation has always helped determine the size of raises, according to a spokesman for Source Edp, a Mountain View, CA-based placement service for data processing personnel. "Inflation isn't as high as it has been in the past," says Michael Meldahl, manager of information systems for the Montana Power Co., Butte. And neither are increases. "On average, we gave 6 percent increases last year," says Meldahl. "A few years ago, we were giving raises that ranged from 9 percent to 11 percent."

In the days of double-digit inflation, steep dp salary increases looked higher, but, like today's, were rarely more than a few percentage points above the inflation rate, according to one tracker of dp salaries in the Midwest. "The real increases are the same now as they were then," he says.

If the annual jumps in dp salaries of the past were not extraordinary, they were still, in some organizations, bigger than the raises received by other employees. The practice continues today. "Our increases were probably a half percent higher than what other Montana Power employees received," says Meldahl.

The special hikes in dp salaries may indicate the department's importance to the organization, or they may be the employer's attempt to discourage job hopping. "I don't want anyone on our staff to have to leave the company to get a raise," says Ken Caracci, director of information systems for General Homes Corp., a Houston-based land developer. Caracci's staff received 10 percent raises last year; most other General Home employees drew 7 percent increases. "A high salary won't completely satisfy a worker, but a low salary can be a hell of a dissatisfier," Caracci says.

An organization needs to offer generous compensation to attract the best talent on the market, Caracci says. Technicians with uncommon expertise receive the highest salaries. Last year, experts in telecommunications, micro-to-mainframe communications, and relational database applications were most sought after, according to Source Edp. "We pay a little more to employees with special skills," says Montana Power's Meldahl. "In our shop, somebody who can build relational databases and write the applications to make them perform is in the highest demand."

WHAT SUPERVISORS GROSS

Position	1984	1985
Systems analysis/systems programming manager/supervisor	$42,000	$40,000
Systems analysis/applications programming manager/supervisor	$38,629	$41,582
Systems programming manager/supervisor	$38,502	$39,603
Systems analysis manager/supervisor	$37,876	$40,000
Applications programming manager/supervisor	$37,500	$37,000
Assistant data processing manager	$36,750	$37,845
Database manager	$35,663	$38,500
Communications manager	$34,400	$34,740
Operations manager/supervisor	$31,997	$29,000
Documentation supervisor	NA	$26,420
Input/output control manager/supervisor	$19,750	$22,000
Key entry supervisor	$18,000	$19,000

All salaries are medians.

NA: Not available

WHAT STAFFERS GROSS

Position	1984	1985
Project/team leader	$38,750	$41,200
Database analyst/programmer	$36,000	$37,000
Lead systems programmer	$36,300	$39,960
Senior systems programmer	$30,357	$33,603
Junior systems programmer	$23,115	$27,592
Lead systems analyst	$35,202	$35,000
Senior systems analyst	$33,250	$34,000
Junior systems analyst	$27,500	$24,000
Lead systems analyst/systems programmer	$34,000	$44,305
Senior systems analyst/systems programmer	$31,000	$38,295
Junior systems analyst/systems programmer	$24,000	$31,000
Lead systems analyst/applications programmer	$34,000	$35,000
Senior systems analyst/applications programmer	$29,431	$33,000
Junior systems analyst/applications programmer	$24,629	$29,695
Lead applications programmer	$32,000	$32,686
Senior applications programmer	$26,904	$24,100
Junior applications programmer	$22,000	$23,304
User-support coordinator	$24,000	$26,389
Documentation specialist	$17,068	$18,000
Communications operator	$20,965	$22,000
Input/output control clerk	$15,123	$17,392
Lead computer operator	$19,240	$20,816
Senior computer operator	$17,673	$17,790
Junior computer operator	$16,603	$14,875
Tape librarian	$13,500	$16,000
Lead key-entry operator	$16,000	$18,673
Senior key-entry operator	$13,312	$16,893
Junior key-entry operator	$12,000	$12,098

All salaries are medians.

Dp shops have long been considered free of sex discrimination that might affect salaries, but *Computer Decisions'* survey found that organizations with only women in a particular position pay them less than the reported overall median for that same position. This was true for 80 percent of the positions for which salary data were collected. Although differences in education, experience, and age, which may lower women's median salaries, could not be taken into account, the pattern showing lower pay for women suggests that equal pay for equal work is not the rule in the dp profession. "It's generally believed that data-processing jobs aren't sex typed, and that whoever is good gets paid well, because workers are in such demand," says Myra Strober, a professor of economics at Stanford (CA) University's School of Education. "But that's not true." Strober examined salary data collected for the 1980 U.S. Census and discovered that—holding education and age constant—women dp professionals earned 12 percent to 20 percent less than men in similar positions. In the entire labor force, the census found that women generally earned 40 percent less than men. Strober says "women do somewhat better" in data processing positions.

The Salary-Status Survey found that the comparative value of various MIS/dp workers to their employees hasn't changed. The typical manager of systems analysis continues to make more than the typical database manager, who continues to make more than the typical communications manager, and so on down the line.

A great disparity in salaries was reported for the user-support coordinator, the survey job title that corresponds most closely to that of information center director. The median salary for the position last year was $26,389. In the Northeast, the median salary for user-support coordinators was $37,000, or 40 percent higher than the overall median. Coordinators in Washington typically earned

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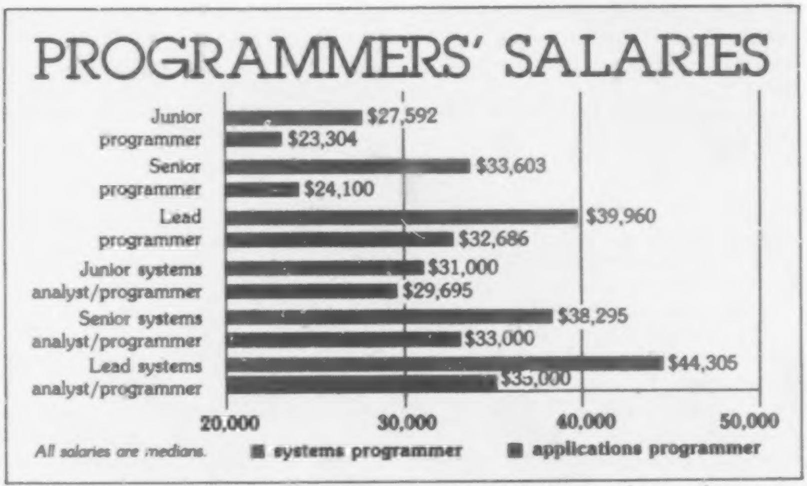

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$16,250 last year, or 40 percent less than the median, and less than half of what their counterparts in the Northeast made. Salaries tend to vary by region, type of organization, and so forth, but, obviously, the salary data also indicate that different organizations assign different values and responsibilities to their information center directors, or user-support coordinators.

"The information center at one organization could provide different kinds of support than the information center at another organization," says Bruce Soderling, general manager of Source Edp. "The workers may be technicians, or may have just a smattering of technology."

Michael Meldahl says that in Montana Power's information center, which is in charge of bringing microcomputers into the utility and implementing a micro-to-mainframe link, the staff's salaries vary widely, depending in part on an employee's technical expertise.

Information center staff salaries may continue to remain inconsistent from organization to organization. In general, experts expect MIS/dp staff salaries should grow at last year's rate through at least the end of the decade. Salary increases won't, however, return the substantial rates common in the inflationary early 1980s. "We're in for a long period of stability," says Meldahl. "Everybody is striving for that." ☐

Computer Decisions' *Salary-Status Survey was conducted by Abbott, Langer & Associates, Crete, IL. For information call (312) 672-4200.*

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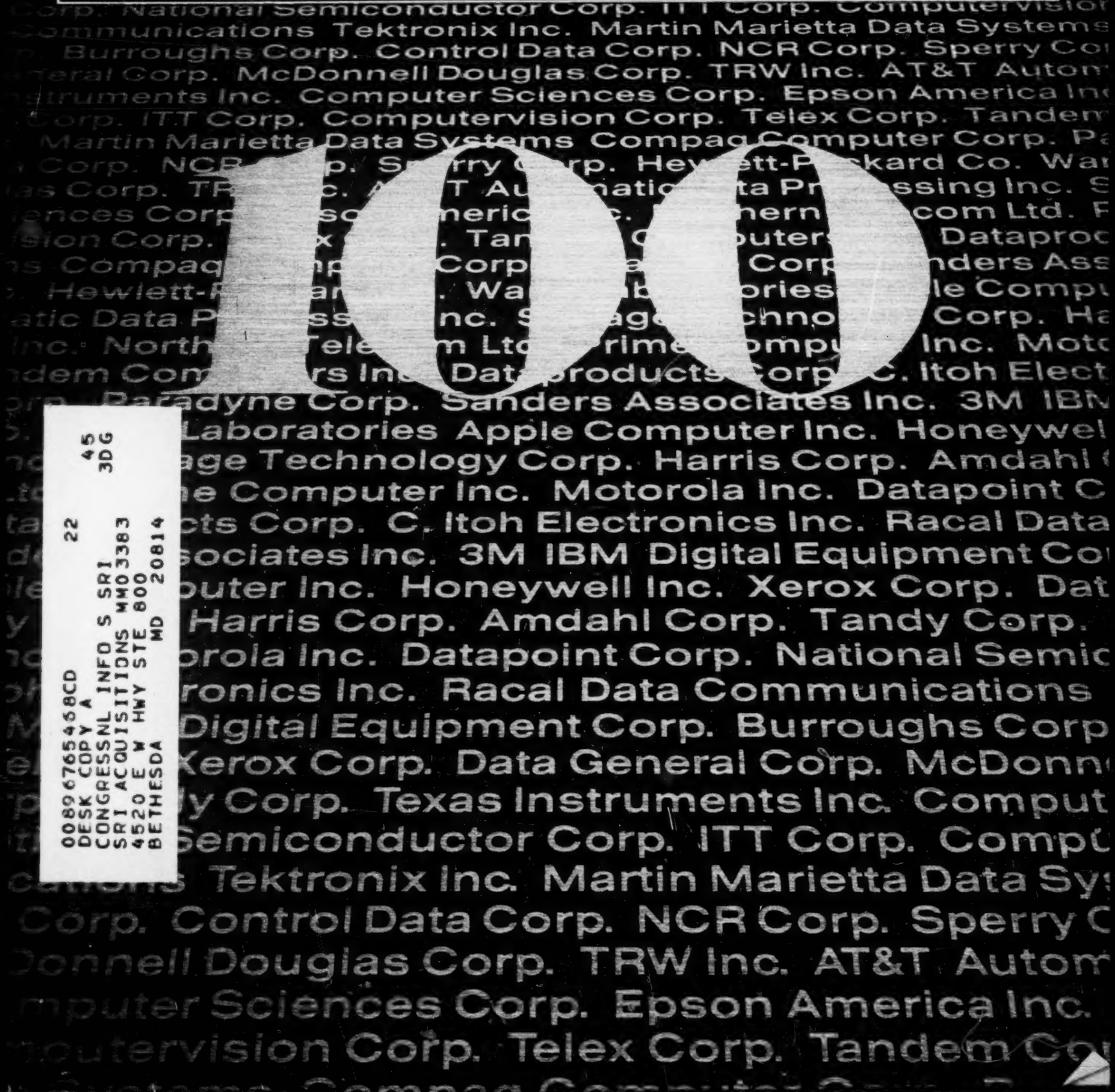
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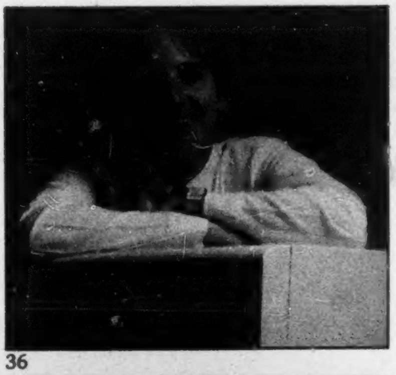

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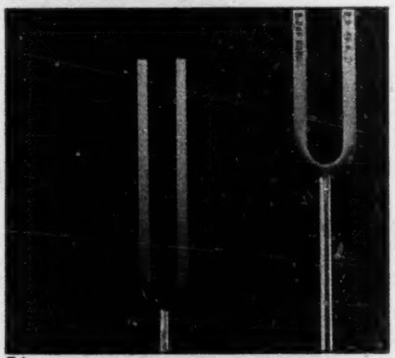

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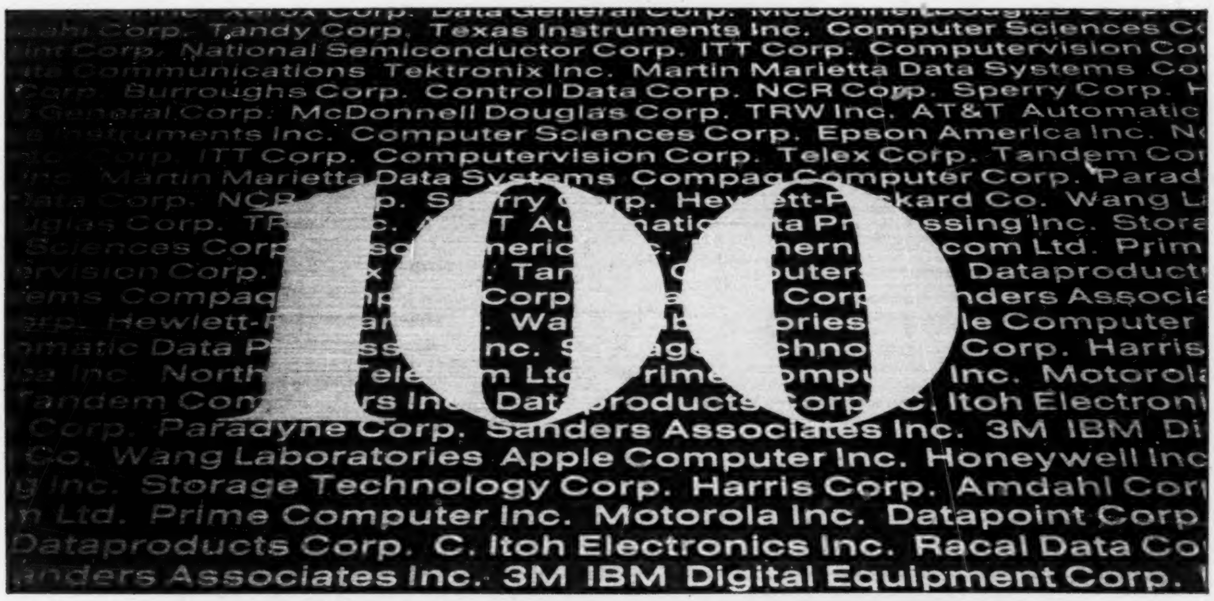
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Dataproducts Corp. C. Itoh Electronics Inc. Racal Data
Sanders Associates Inc. 3M IBM Digital Equipment Corp.

THE YEAR THE PARTY ENDED

1985 was a year of troubles for a dp industry that expected many happy returns.

by Lee Keough, Industry Editor

For the data processing industry, last year was a hangover after a frenzy of selling. The worst part of the downtrend: the aftereffects of plant closings, layoffs, and sales declines continued into the first half of this year.

Some industries would be happy to grow at the 9.2 percent rate achieved by the *Computer Decisions* 100, but this is a paltry number to corporations accustomed to growth rates of 20 percent or higher. Viewed in relation to the rest of the economy, the *Computer Decisions* 100 (see list on pages 60-61) had a mediocre, but not disastrous, year.

Last year, almost every market segment turned soft, with the exception of supercomputers, add-on products for microcomputers, and dp services. The U.S. Department of Commerce pegs the 1985 growth rate for domestic computer manufacturers at 8 percent, although it says software revenues grew by a robust 23 percent. Analysts at the Commerce Department say the weakest markets were mainframes and 16-bit minicomputers.

Commerce Department analysts had expected this year to be slightly better, predicting a 16 percent sales growth in equipment and a 25 percent

COMPUTER DECISIONS 100

	'85	'84	Company	'85 Revenues (000)	'85/'84 Growth (%)	'84 Revenues (000)
	1	1	IBM (Armonk, NY)	48,100,000	9.6	43,900,000
	2	2	Digital Equipment Corp. (Maynard, MA)	7,029,407	12.8	6,229,629
	3	3	Burroughs Corp. (Detroit)	4,812,700	6.5	4,520,800
	4	4	Sperry Corp. (New York)	4,755,000	18.4	4,015,000
▲	5	6	NCR Corp. (Dayton, OH)	3,894,132	6.3	3,664,748
▲	6	7	Hewlett-Packard Co. (Palo Alto, CA)	3,726,600	14.0	3,269,000
▼	7	5	Control Data Corp. (Minneapolis)	3,679,700	−0.3	3,692,600
	8	8	Wang Laboratories Inc. (Lowell, MA)	2,428,300	0.3	2,421,145
▲	9	10	Honeywell Inc. (Minneapolis)	1,951,900	7.0	1,825,000
▼	10	9	Apple Computer Inc. (Cupertino, CA)	1,753,873	−7.6	1,897,944
▲	11	15	AT&T (New York)	1,740,000	61.1	1,080,000
▼	12	11	Xerox Corp. (Stamford, CT)	1,609,000	11.2	1,446,600
▲	13	14	TRW Inc. (Cleveland)	1,450,000	31.2	1,105,000
▼	14	12	Data General Corp. (Westboro, MA)	1,199,028	−4.4	1,254,200
▲	15	17	McDonnell Douglas Corp. (St. Louis)	1,119,000	26.0	888,000
	16	16	Automatic Data Processing Inc. (Roseland, NJ)	1,102,097	15.0	958,287
▲	17	19	General Motors / Electronic Data Systems (Dallas)	978,300	12.9	866,600
▲	18	22	Tandy Corp. (Fort Worth, TX)	910,000	26.6	719,060
▲	19	24	Computer Sciences Corp. (El Segundo, CA)	867,000	22.2	709,634
▲	20	21	Amdahl Corp. (Sunnyvale, CA)	862,032	10.6	779,400
▼	21	18	General Electric Co. (Fairfield, CT)	855,000	−2.3	875,000
▼	22	13	Commodore International Ltd. (West Chester, PA)	798,600	−34.0	1,209,400
▲	23	26	Prime Computer Inc. (Natick, MA)	769,673	19.7	642,779
▼	24	23	Texas Instruments Inc. (Dallas)	760,000	6.5	713,640
▲	25	27	Motorola Inc. (Schaumberg, IL)	704,000	13.9	618,000
▼	26	20	Storage Technology Corp. (Louisville, CO)	673,400	−16.7	808,584
▲	27	29	National Semiconductor Corp. (Santa Clara, CA)	650,000	8.3	600,000
▲	28	32	Tandem Computers Inc. (Cupertino, CA)	634,546	22.4	518,414
▲	29	30	ITT (New York)	625,000	8.7	575,000
▼	30	25	Northern Telecom Inc. (Nashville, TN)	600,000	−7.7	650,000
▲	31	35	Telex Corp.(Tulsa, OK)	597,426	34.9	442,735
▲	32	33	Harris Corp. (Melbourne, FL)	542,000	7.7	503,100
▲	33	37	Intergraph Corp. (Huntsville, AL)	526,405	30.4	403,762
	34	34	Epson America Inc. (Torrance, CA)	520,000	4.0	500,000
▲	35	44	Compaq Computer Corp. (Houston)	503,880	57.5	320,000
▼	36	31	Computervision Corp. (Bedford, MA)	441,944	−20.6	556,342
▲	37	41	Martin Marietta Corp. (Bethesda, MD)	429,900	18.9	361,600
▲	38	42	GTE Corp. (Stamford, CT)	420,000	16.7	360,000
▼	39	28	Datapoint Corp. (San Antonio, TX)	414,682	−30.9	600,539
▲	40	50	Cray Research Inc. (Minneapolis)	380,158	66.2	228,752
▼	41	39	Tektronix Inc. (Beaverton, OR)	367,000	−5.1	386,600
▲	42	48	Zenith Electronics Corp. (Glenview, IL)	352,000	41.4	249,000
	43	43	3M (St. Paul, MN)	350,000	1.3	345,500
▲	44	46	Sanders Associates Inc. (Nashua, NH)	329,600	24.7	264,300
▼	45	40	The Racal Corp. (Boca Raton, FL)	328,000	−13.9	381,000
▲	46	47	Shared Medical Systems Corp. (Malvern, PA)	312,207	21.6	256,753
—	47	—	Eastman Kodak Co. (Rochester, NY)	300,000	—	—
▲	48	53	Apollo Computer Inc. (Chelmsford, MA)	295,575	36.9	215,930
	49	49	Contel Corp. (Atlanta)	277,800	14.6	242,400
▼	50	45	Paradyne Corp. (Largo, FL)	252,529	−12.9	289,981

—Not ranked among Computer Decisions 100 in 1984.

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COMPUTER DECISIONS 100

	'85	'84	Company	'85 Revenues (000)	'85/'84 Growth (%)	'84 Revenues (000)
▲	51	58	Xidex Corp. (Mountain View, CA)	249,727	27.9	195,288
—	52	—	MAI Basic Four Inc. (Tustin, CA)	249,000	—	N/A
▼	53	52	Liebert Corp. (Columbus, OH)	248,243	14.0	217,744
▲	54	55	Gould Inc. (Rolling Meadows, IL)	248,000	19.5	207,500
—	55	—	Sterling Software Inc. (Dallas)	237,224	291.8	60,550
▼	56	54	The Boeing Co. (Seattle)	225,000	7.1	210,000
▲	57	72	Lotus Development Corp. (Cambridge, MA)	225,000	43.3	156,978
▲	58	62	Planning Research Corp. (McLean, VA)	218,874	17.5	186,261
▲	59	66	Centronics Data Computer Corp. (Hudson, NH)	216,000	25.9	171,504
▼	60	51	Schlumberger Ltd. (New York)	214,000	−4.9	225,000
▼	61	56	Gerber Scientific Inc. (Hartford, CT)	210,387	3.8	202,616
▼	62	61	Quotron Systems Inc. (Los Angeles)	205,686	8.4	189,799
▲	63	65	UCCEL Corp. (Dallas)	204,714	18.0	173,433
▲	64	68	Bell Atlantic Corp. (Philadelphia)	202,000	18.8	170,000
▲	65	67	Micom Systems Inc. (Simi Valley, CA)	194,246	13.4	171,323
▲	66	69	The Reynolds & Reynolds Co. (Dayton, OH)	192,926	16.3	165,834
—	67	—	Okidata Corp. (Mt. Laurel, NJ)	190,000	—	—
—	68	—	HBO & Co. (Atlanta)	189,000	113.1	88,682
▲	69	73	Cullinet Software Inc. (Westwood, MA)	185,595	23.3	150,484
▼	70	57	NEC Information Systems Inc. (Boxborough, MA)	184,000	−8.0	200,000
	71	71	General Datacomm Industries Inc. (Middlebury, CT)	179,382	11.2	161,263
▼	72	64	NBI Inc. (Boulder, CO)	172,000	−2.8	176,864
▲	73	92	AST Research Inc. (Irvine, CA)	170,965	46.5	116,710
▲	74	93	Computer Associates International Inc. (Garden City, NY)	170,400	46.8	116,091
▼	75	74	Decision Data Computer Corp. (Horsham, PA)	167,000	13.6	147,017
▲	76	94	MTech Corp. (Dallas)	165,000	42.2	116,000
▼	77	76	Recognition Equipment Inc. (Irving, TX)	163,147	16.4	140,140
▲	78	84	Microsoft Corp. (Redmond, WA)	162,400	29.9	125,000
▼	79	78	ISC Systems Corp. (Spokane, WA)	161,518	16.4	138,703
▲	80	85	Telerate Inc. (New York)	161,163	31.5	122,566
—	81	—	Intelogic Trace Inc. (San Antonio, TX)	159,097	—	N/A
▼	82	60	Diebold Inc. (Canton, OH)	158,000	−16.8	190,000
▼	83	75	Management Science America Inc. (Atlanta)	151,661	6.9	141,816
▼	84	83	Ameritech Inc. (Chicago)	150,000	17.0	128,200
—	85	—	Sun Microsystems Inc. (Mountain View, CA)	147,100	112.3	69,300
▼	86	77	National Data Corp. (Atlanta)	146,545	4.7	139,961
▼	87	63	CPT Corp. (Minneapolis)	139,276	−22.0	178,636
—	88	—	Mentor Graphics Corp. (Beaverton, OR)	136,700	55.5	87,900
—	89	—	Daisy Systems Corp. (Mountain View, CA)	133,637	63.8	81,572
▼	90	89	Hayes Microcomputer Products Inc. (Norcross, GA)	133,000	10.8	120,000
▼	91	86	Altos Computer Systems (San Jose, CA)	132,182	8.5	121,829
▲	92	97	Commerce Clearing House Inc. (Chicago)	126,803	11.3	113,962
▼	93	91	Floating Point Systems Inc. (Beaverton, OR)	126,568	6.9	118,415
▼	94	80	Intecom Inc. (Allen, TX)	123,600	−6.1	131,678
▼	95	87	Intelligent Systems Corp. (Norcross, GA)	122,712	1.2	121,297
—	96	—	Wyse Technology (San Jose, CA)	120,478	102.0	59,640
▼	97	95	Anacomp Inc. (Indianapolis)	120,000	3.6	115,779
—	98	—	Bolt, Beranek and Newman Inc. (Cambridge, MA)	120,000	44.6	83,000
▼	99	82	Dun & Bradstreet Corp. (New York)	120,000	−7.7	130,000
	100	100	National Computer Systems Inc. (Eden Prairie, MN)	117,500	17.9	99,656

The Computer Decisions 100 includes vendors whose revenues from sales to end users constitute 50 percent or more of total data-processing revenues.

increase in software. But this prediction may be optimistic, analysts now concede. Equipment orders tracked through the end of March are relatively flat compared to last year, according to the Commerce Department's Bureau of the Census.

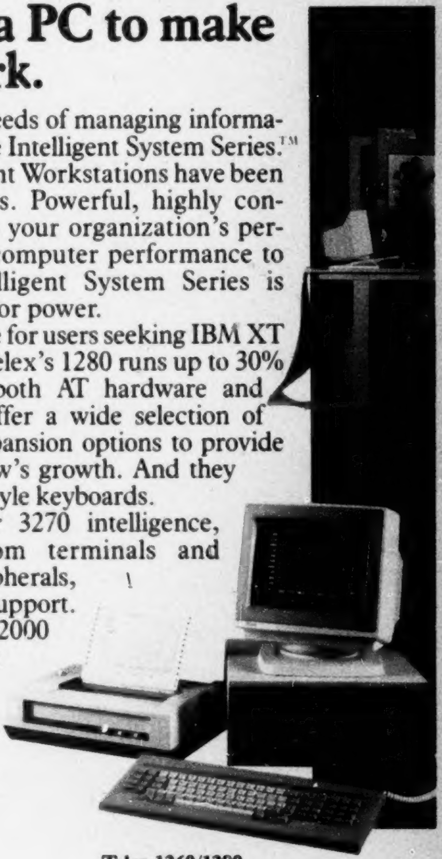
What's gone wrong? The debate among analysts and vendors has been lively, but a lackluster economy, which has been particularly weak among manufacturers, is the most oft-cited cause. John F. Akers, chairman and CEO of IBM, originally blamed the strong dollar for much of IBM's slump in sales. But now that the value of the dollar has dropped, he blames user uncertainty over tax-reform legislation, among other reasons.

Kenneth H. Olsen, president of Digital Equipment Corp., Maynard, MA, the second largest dp vendor, agrees that tax reform proposals have affected buying patterns. Tax revisions in 1981 helped spur the surge in capital equipment spending until last year, he notes. Another factor is that corporations, after a microcomputer buying spree, are now pausing to evaluate their investments, says Olsen. As corporations attempt to build corporatewide networks, executives demand that equipment will communicate between departments. As a result, says Olsen, all computer purchases are being studied at the highest corporate level, causing longer evaluations. "It's becoming a top-down decision," says Olsen.

William F. Zachmann, industry observer at International Data Corp., Framingham, MA, believes the problem is much more fundamental. Zachmann, one of the few analysts who predicted the slump would be deep, says the computer industry is undergoing "a changeover from traditional systems to microprocessor-based systems." For the first time, users are finding that smaller systems give them better price/performance than larger systems, he says.

As an example, Zachmann says the cost of 1 million instructions per second (MIPS) on an IBM 3090 mainframe is more than $180,000, compared to $110,000 for 1 MIPS on an IBM 4381. The same power on a DEC VAX system, says Zachmann, ranges from $60,000 to $80,000 and 1 MIPS on a MicroVAX II costs $45,000. To place numerous applications on a mainframe "no longer makes economic sense," he says. If Zachmann's theory proves correct, it would explain why IBM has been hit harder than some other vendors. With its emphasis on mainframes, IBM has the most to lose from a trend toward smaller computers.

The "Zachmann effect" may be hurting other mainframe vendors as well, particularly the Bunch (Burroughs, Sperry, formerly Univac,



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NCR, Control Data, and Honeywell). With the exception of Sperry, each had a dismal 1985, fighting IBM's increasing dominance as well as the move to distributed setups of smaller systems.

Sperry was a surprise, reporting an 18.4 percent increase in revenues over 1984. Sperry's top-of-the-line mainframe, the 1100/90, was introduced in 1984, and an entire year of bulk shipments helped increase Sperry's revenues. A Sperry spokesman also credits the vendor's success to a strong increase in microcomputer orders. Last year Sperry began shipments of Unix-based minis and micros and introduced two new IBM-compatible micros.

Sperry performed so well in 1985 that it nearly bumped Burroughs out of the number three position. Ironically, it may be the last year Sperry has a chance to regain the number three ranking it once enjoyed. At press time, Burroughs' second bid for Sperry in a year makes a takeover of the New York-based vendor likely.

Like Sperry, Burroughs also introduced a new mainframe series last year, but gains from the new system were partially offset by losses in its Memorex line of plug-compatible peripherals and storage devices.

One large vendor that achieved a modicum of success last year was minicomputer vendor Hewlett-Packard Co. Its computer revenues jumped 14 percent, which Grant Bushee, executive vice president of Infocorp, a Cupertino, CA, market-research house, says is a credit to its marketing forces. "Hewlett-Packard has done amazingly well with an obsolete, 16-bit architecture," he says. Bushee says 1986 will be a different story, as users are expected to hold off buying Hewlett-Packard computers in anticipation of its new Spectrum line of reduced instruction set computer (RISC) processors.

The *Computer Decisions* 100 lists 11 new names this year. Several vendors make the list for the first time due to mergers and divestitures.

Eastman Kodak appears on the list by virtue of its acquisition of Verbatim Corp., Sunnyvale, CA, as well as its drive into computerized publishing. Intelogic Trace is the former maintenance arm of Datapoint, spun off after Datapoint's takeover by arbitrageur Asher B. Edelman. Edelman was also responsible for dismantling two former *Computer Decisions* 100 vendors, Management Assistance Inc. and Mohawk Data Sciences. MAI Basic Four appears on the ranking in place of Management Assistance. Sorbus, formerly the maintenance subsidiary of Management Assistance, was bought by Bell Atlantic in 1984.

Another Bell holding company that appears is Ameritech, which bought

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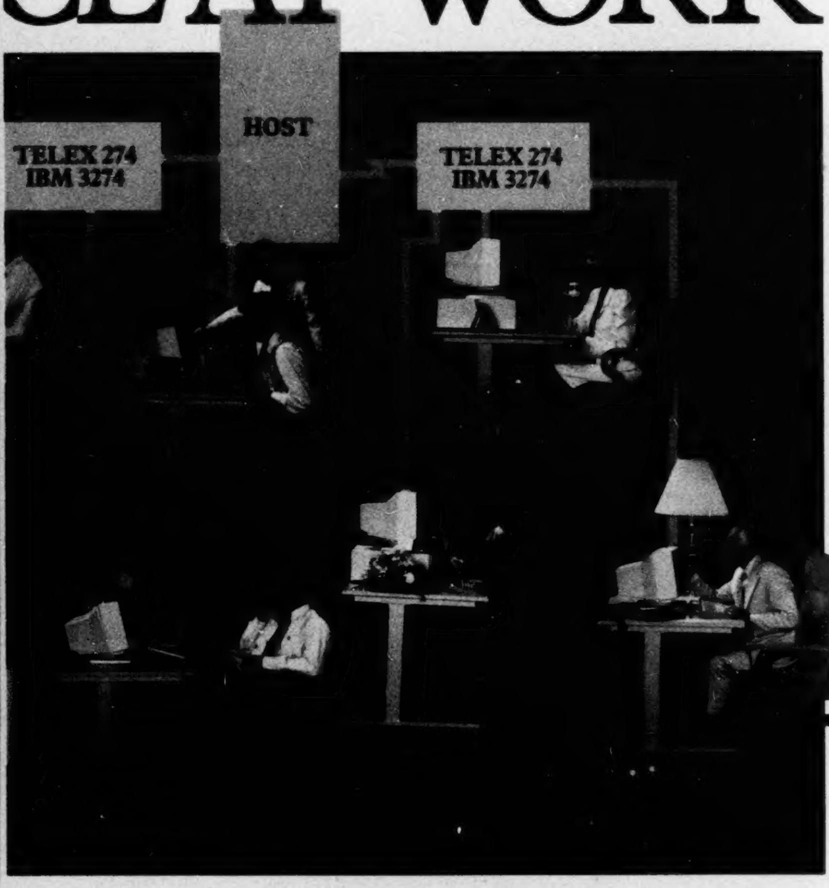

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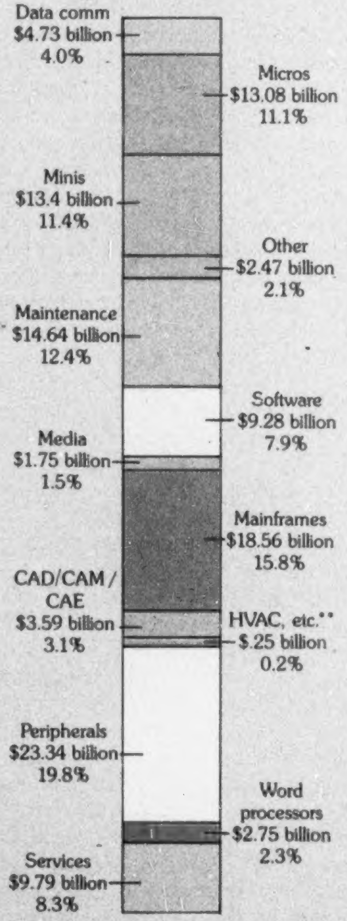
CIRCLE 30

systems software vendor Applied Data Research, Princeton, NJ. Sterling Software purchased Informatics General, a software company 10 times its size, and thus appears both for the first time and as the largest software vendor. HBO & Co. made two acquisitions, both of which provide data processing products and services to the health care industry.

Despite the industry slowdown, some vendors achieved success due to internal growth. The market for computer-aided engineering (CAE) systems ballooned.

The presence of terminal-maker Wyse Technology proves a vendor doesn't always need a hot market to soar to the top. Few markets have been as pressured as the terminal market, as evidenced by the fall of former

MARKET ANALYSIS



**Total 1985 industry revenues: $117.63 billion*

***Environmental-control gear*

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IBM PROSPECTS FOR RICH FRONTIERS

> "Users are starting to realize that the cost of an IBM mainframe is out of line."
>
> *Zachmann, IDC*

Gracing the cover of IBM's 1985 annual report is, of all things, a Buick. An auto worker leans across the car to reach an IBM terminal.

The photograph may be a surprising choice of images for the world's premier computer vendor, but it highlights a new reality for IBM. IBM can no longer expect mere renewal and replacement of its many product lines to spur growth, says Thomas Henkel, an analyst at the Yankee Group, Boston. High growth will only come from expansion into new businesses, like manufacturing automation and communications. Without new markets, IBM's gigantic size may limit it to more conservative growth rates, despite continued domination of the information-processing market.

John F. Akers, IBM chairman and chief executive officer, recently conceded to shareholders that "the year's performance did not come up to our own expectations." Saying 1985 was "a very tough year for the industry," Akers noted, "IBM did not emerge unscathed."

Akers' remark accurately reflected IBM's 1985 performance. Just a year earlier, Akers predicted "solid growth" for 1985, saying "prospects have never been brighter" for IBM. But IBM ended the year with $50.2 billion in total revenues, an increase of less than 9 percent over 1984. *Computer Decisions* estimates that IBM's revenues from the sale of data processing products and services increased only 9.6 percent, to $48.1 billion. Earnings, in which IBM normally excels, declined by $30 million, to $6.55 billion.

Even those disappointing results could have been much worse if IBM had not hiked the price of its software and moved up scheduled shipments of its new 3090 mainframe, contends Bob Djurdjevic, president of Annex Research, a Phoenix consultancy. IBM software revenues increased last year by more than 30 percent over 1984. IBM did it by dramatically increasing the price of its operating system software, a market in which IBM has no competition. Revenues from maintenance services—another relatively captive IBM market—also increased at a higher rate than overall business. Other achievements were a 14 percent revenue increase from storage devices and a 32 percent revenue increase from the personal-computer line.

These successes mask underlying problems, say many analysts, problems to which there are no immediate solutions. Many IBM-watchers are predicting that IBM's lackluster financial performance last year is only the beginning of several single-digit growth years for what many consider the United States' premier manufacturer.

Analysts cite myriad reasons for IBM's current difficulties, ranging from incompatibility between IBM systems to a fundamentally weak domestic economy. They are divided over whether IBM's 3090 mainframe, introduced last year, is meeting IBM's expectations. Djurdjevic and others say the 3090 is selling moderately well.

leader Televideo Systems Inc. (Sunnyvale, CA) from the ranking. Wyse climbed onto the *Computer Decisions* 100 simply by offering an attractively priced product line.

Understanding how some succeeded in spite of the computer slump of 1985 may be small consolation to the majority of vendors. They've got another tough year to cope with as 1986 sales remain soft, leaving few growth opportunities. In this climate, vendors will need more than appealing products to hang on until the good times start to roll again. □

Francis Gens of International Data Corp. (IDC), a market research house based in Framingham, MA, and Brian Jeffery of International Technology Group, Palo Alto, CA, say 3090 sales have been disappointing.

"The 3090 is a big problem," says Jeffery. "It's quite unprecedented for a new mainframe to get such a weak reception. IBM has cut prices and accelerated deliveries, and the 3090 is still weak." Gens blames a lack of differentiation between the 3090 and the 308X mainframe, IBM's former top-of-the-line mainframe, as one reason for the 3090's disappointing performance. But Gens adds that larger economic issues are also having an effect. Traditional volume purchasers of mainframes, such as government agencies and petrochemical producers, are facing budget squeezes, says Gens.

Djurdjevic believes IBM will have to fend off the 3090's competitors after the plug-compatible vendors start volume shipments of new mainframes next year. That's why he, too, is predicting future single-digit growth rates for IBM.

The most important long-term issue facing IBM, according to Gens and William F. Zachmann, an IDC analyst, is the movement away from centralized mainframes to combinations of smaller competitors. Users are finding they can gain price/performance benefits by moving applications to smaller systems. "Users are starting to realize that the costs of an IBM mainframe system are totally out of line," says Zachmann.

Because IBM gains most of its profits from its mainframes, Zachmann predicts that IBM will have a quarterly loss in 1987 or 1988. Although Gens agrees with Zachmann, he believes IBM's slippage will be more gradual. Users will not move existing applications off their mainframes, says Gens, but will build new applications on smaller systems.

Not all analysts believe that IBM's problems are due to a waning interest in mainframes, but they agree that IBM's future is uncertain. IBM's financial performance is no longer predictable, they say, because IBM has become a slave to user demand. By converting its customers from rental to purchase, IBM can no longer control its revenue stream by increasing prices to a captive rental market, they note.

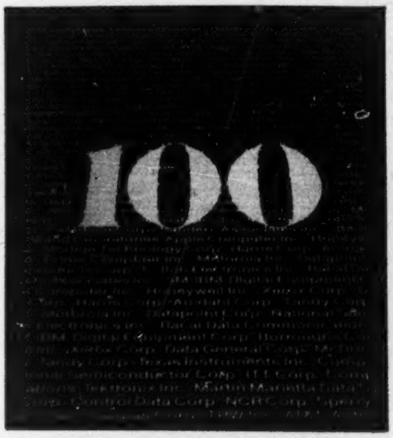
In addition to a sluggish economy at home, IBM has blamed its slowdown on a lack of demand for its intermediate systems. Analysts say this is no surprise because IBM minicomputers are not as attractive as the competition's, and IBM lacks the communications strategy that would overcome this deficiency.

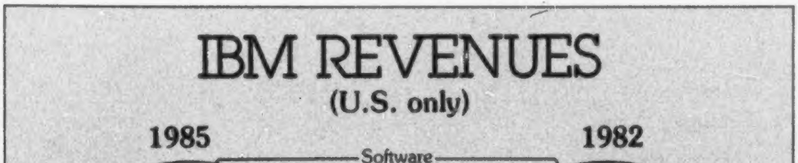
"The IBM world is extraordinarily messy and irrational in many ways," says Zachmann. For that reason, Gens predicts that IBM will allow all systems, except those based on the 370 architecture, the IBM PC, and the System/36 minicomputer, to quickly fade. The only reason IBM will continue to embrace the System/36, says Gens, is because of its large user base.

Yet, for all the talk about demand, IBM is selling more, not fewer, computers. The dilemma is that IBM's capacity to make and sell products greatly outweighs the demand for them. Between 1980 and 1985, IBM made an investment in plants and equipment of more than $20 billion.

Djurdjevic estimates that at the end of 1985, IBM's inventory had a market value of $29 billion. To work that off, IBM is going to have to cut prices, Djurdjevic believes, and that will eventually put a squeeze on profits.

What can IBM do? It has already instituted an austerity program, cutting




IBM REVENUES
(U.S. only)

Source: IBM

travel expenses and hiring. Other measures include plant consolidation and the sale of its retail stores.

But austerity measures won't be enough if IBM does not score successes in new markets. For that reason, IBM has introduced a vector processor for scientific and engineering uses, made a push into manufacturing with new industrial computers and the IBM RT PC, and tried to provide systems integration services. Its largest investment in a new market has been in communications, with its 1984 purchase of private branch exchange (PBX) maker Rolm Corp., and its 1985 purchase of a major stake in the second largest long-distance communications vendor, MCI Corp., Washington.

This push into communications has thus far produced disappointing results, notes Eric Arnum, editor of *Telecom/IBM*, a newsletter published

FOR SOME, THE PARTY LINGERS

Some of the *Computer Decisions* 100 sailed through 1985 as if the worldwide clamor for computers had continued to grow. A glance at the growth rates of these 20 hale and hearty vendors (see chart) proves that slackened demand for dp products and services was not universal.

AT&T, generally considered a weakling in the computer industry, may be the most startling name on this list. Its stellar performance is largely due to a new line of private branch exchanges (PBXs)—the first upgrade in several years—that overwhelmed the competition. AT&T also achieved success with its IBM-compatible micro, the AT&T 6300, although its effort to market Unix-based micros fell flat.

The real test for AT&T should occur over the next few years. Analysts note that AT&T is beginning to battle for control of the desktop with the introduction of Starlan, its local-area network. AT&T's strategy is to gain a presence in data processing by linking its telecommunications products through Starlan to its data terminals and micros, says Kathryn Korostoff, an analyst with Northern Business Information, New York. Because of AT&T's huge installed base of PBXs, Korostoff says, Starlan has the potential to dramatically change the telephone giant's role as a dp vendor. Another boost to AT&T's growth may come from relaxation of government regulations prohibiting AT&T from selling its dp products along with its telecommunications products.

Two other micro vendors, Compaq Computer Corp. and Zenith Electronics Corp., were once again among the top performers, demonstrating that the corporate appetite for micros is largely unsated even if the market for non-IBM compatible micros seems to have crashed. Vendors in related markets also continued to do well. AST Research Inc., maker of add-on products for IBM, Apple, and Digital Equipment computers, cashed in on the popularity of products like its Six Pak Plus multifunction board.

High-flier Lotus Development Corp., marketer of the 1-2-3 spreadsheet package, remains the leading independent vendor of micro software. Recently, Lotus has been on an acquisition tear, possibly to blunt Wall Street criticism that it is a one-product company. It is too soon to tell whether these acquisitions can keep Lotus' growth at current rates.

Computer Associates International Inc., Sterling Software, and HBO & Co. made the list of top performers largely through acquisitions. But the three vendors also demonstrated market strength beyond the initial benefits of acquisitions.

MTech and Telerate provide dp services to the financial industry, a high-growth market. MTech provides software and services to banks, while Telerate provides the system needed to obtain immediate quotations for federal securities and precious metals.

Wyse Technology and Telex Corp. are succeeding in the difficult periph-

HALE AND HEARTY

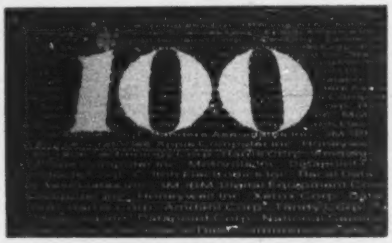
Company	'85/'84 Growth (%)	'85/'84 Rank
Sterling Software Inc.	291.8	55/–
HBO & Co.	113.1	68/–
Sun Microsystems Inc.	112.3	85/–
Wyse Technology	102.0	96/–
Cray Research Inc.	66.2	40/50
Daisy Systems Corp.	63.8	89/–
AT&T	61.1	11/15
Compaq Computer Corp.	57.5	35/44
Mentor Graphics Corp.	55.5	88/–
Computer Associates International	46.8	74/93
AST Research Inc.	46.5	73/92
Bolt, Beranek and Newman Inc.	44.6	98/–
Lotus Development Corp.	43.3	56/72
MTech Corp.	42.2	76/94
Zenith Electronics Corp.	41.4	42/48
Apollo Computer Inc.	36.9	48/53
Telex Corp.	34.9	30/35
Telerate Inc.	31.5	80/85
TRW Inc.	31.2	13/14
Intergraph Corp.	30.4	33/37

—Not ranked among Computer Decisions *100 in 1985.*

by market researcher International Resource Development Inc., Norwalk, CT. However, it is much too early to write it off as a failure. Analysts say IBM has yet to break even on its investment in Rolm, but Arnum says that is to be expected because there is no real integration between the product lines. This will change in about three years, he says, noting that joint IBM/Rolm research is accelerating.

Jeffery paints a darker future for IBM. "Even if IBM succeeds in diversifying into telecommunications and factory automation, it will be just a drop in the bucket," he says. "The fact is, the Big Blue growth machine is no more."

Akers may not agree with Jeffery's harsh assessment, but he does admit that IBM fortunes won't change immediately. As he recently told stockholders, IBM "faces a demanding year ahead." ☐



erals business. Wyse manufactures low-cost ASCII terminals. Telex is a vendor of IBM 3270-compatible peripherals.

Other top performers took advantage of new and growing markets. Sun Microsystems Inc., Daisy Systems Corp., Apollo Computer Inc., and Mentor Graphics market micro-based workstations for use in computer-aided engineering (CAE) applications. Demand for scientific computers has boosted performance for Cray Research Inc., a manufacturer of supercomputers.

What are the long-term prospects for these vendors? Even vendors of the hottest products can be surprised when user interest suddenly cools. The CAE market slowed late last year; Daisy Systems, Mentor Graphics, and Apollo all had trouble maintaining high growth rates. Sun Microsystems racked up record sales, but is falling short of profit goals this year.

The abrupt slowdown in CAE systems is only the most recent market setback for the dp industry. The top performers on the *Computer Decisions* 100 are high fliers only in relation to others in the industry. The 20 best performers of a year ago all had growth rates of at least 50 percent. This year, vendors with growth rates of 30 percent are singled out for their achievements. Thus, 1985 left even the industry's top performers wondering if the growth rates of old are gone forever. ☐

UP & COMERS: BREAKING OUT OF THE PACK

Despite an industrywide slump—or perhaps because of it—1985 was a charmed year for some data processing vendors. Seven vendors, the *Computer Decisions* Up & Comers, reported revenue growth of at least 50 percent and sales of more than $50 million. If good fortune stays with them, it won't be long before these vendors rank among the *Computer Decisions* 100.

Three of this year's Up & Comers are repeat performers—Iomega Corp., Ashton-Tate, and Digital Communications Associates Inc. (DCA). Each markets products for microcomputers.

Iomega, maker of the Bernoulli Box micro storage system, barely missed a place on the *Computer Decisions* 100 after more than doubling its 1984 sales. Although the Bernoulli Box was originally created as a disk drive for the original equipment manufacturer (OEM) market, most of Iomega's success has come from selling the product directly to end users, as either an expansion or backup storage system. The Bernoulli Box boasts the speed and capacity of a hard-disk drive, as well as the durability and portability of a floppy-disk drive.

Iomega's early failure to convince OEMs to purchase its unique device may have saved the vendor from a market setback, because it was not dependent on sales to microcomputer vendors. "Iomega is just starting to get into the OEM market," says Kenneth Leung, an analyst with the New York stock brokerage of Smith Barney, Harris Upham & Co. OEMs were reluctant to buy the Bernoulli Box at its inception because Iomega was a startup and the only supplier of the design. Leung expects Iomega will have more success with its new disk drive for OEMs. He also believes Iomega's sales to end users will continue to grow, because he anticipates no slowdown in the add-on micro market.

With the success of its database packages, Ashton-Tate continues to climb to the top.

That's good news for Ashton-Tate, which recently began marketing its dBase III Plus software for networked micros. With the success of its database packages, Ashton-Tate continues to steadily climb into the top echelon of software vendors. "Ashton-Tate's dBase packages have a real lock on the market," says Ruthann Quindlen, an analyst with Alex Brown and Sons Inc., a Baltimore-based stock brokerage.

Ashton-Tate's late-1985 acquisition of Multimate International Corp., producer of Multimate, a best-selling word processing package, should fuel this year's growth. With the release of three new packages, including one for the Macintosh from Apple Computer Corp., Cupertino, CA, expected by the end of this year, Quindlen says 1986 should be another banner sales year.

DCA is still riding the crest of the success of its Irma line of micro-to-

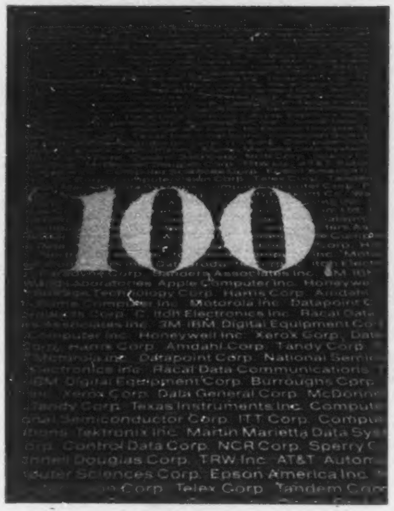
(Continued on page 70)

(Continued from page 67)

mainframe links. But DCA has also done an "outstanding job" of developing enhancements and additions to its family of wide-area networking products, says Andrew Schopick, an analyst with Gartner Securities Corp., Stamford, CT. Schopick estimates that 35 percent to 40 percent of DCA's sales come from its wide-area networking line, which includes statistical multiplexers, network processors, and modems.

Although Schopick is optimistic about DCA's short-term outlook, he notes that IBM could make the Irma line obsolete by introducing a new micro or a linking board of its own. "The long-term outlook is open to question," says Schopick.

Since some observers cite the difficulty of connecting computers as a major factor in last year's disappointing industry performance, it's not surprising that vendors of local-area networks (LANs) were outstanding performers.



3Com Corp. of Mountain View, CA, which manufactures LAN software and hardware, has been "extremely successful" with a marketing strategy that focuses on end users, says Patrick Gordon of the Yankee Group, a Boston-based market research firm. Gordon expects 3Com's products to be significantly challenged by IBM's token-ring LAN and AT&T's Starlan. But, he adds, 3Com is working to diminish the risk by making its software compatible with Starlan, and, in cooperation with AT&T, developing a 3Com network server to Starlan.

Despite calling off a proposed merger with Convergent Technologies Inc., San Jose, CA, Gordon believes 3Com may ultimately benefit from a similar merger with a microcomputer manufacturer. "Users want a single source," he says, "and 3Com is better equipped to do that than many vendors."

Gordon is not as sanguine about the long-term prospects of Sytek Inc. of Mountain View, CA. Sytek provided the proprietary technology for the IBM PC Network, which formed the basis of IBM's LAN strategy until it announced the token-ring network. "Sytek has a tough row to hoe, because the LAN it manufactures is no longer IBM's standard," says Gordon.

Although Sytek's OEM relationship with IBM was a major factor in its 1985 growth, the company says its own sales to end users also grew. Sytek asserts that its broadband LAN offers users more connections than IBM's token-ring approach.

Another vendor that has benefited from its role as a supplier to IBM is Stratus Computer Inc., a maker of fault-tolerant online transaction-processing systems. IBM's decision to market Stratus computers has not only given Stratus a huge new distribution channel, but has attracted many new direct-sale customers. Still, Ron Slate, a spokesman, estimates that more than 75 percent of its 1985 revenues were from direct sales. "IBM has been like the 'Good Housekeeping Seal of Approval' for us," he says.

Slate expects Stratus to benefit from increasing demand for fault-tolerant systems because there are only two suppliers of the systems: Stratus and archrival Tandem Computers Inc., Cupertino, CA. Omri Serlin, a consultant with Itom International Co., Los Altos, CA, agrees that the market should continue to enjoy "substantial growth" but doubts that Stratus can continue its dramatic growth rate as its revenue base expands.

Rounding out the list of Up & Comers is Symbolics Inc., the first vendor to score success in the budding artificial-intelligence market. Symbolics markets Lisp-processing workstations, used in the design of complex computer systems.

Symbolics faces a competitive challenge from more traditional computer vendors offering similar products, such as Texas Instruments Inc. (Dallas), Digital Equipment Corp. (Maynard, MA), and Xerox Corp. (Stamford, CT), says Roseann Stach, an artificial-intelligence analyst with Dataquest, the San Jose, CA, market researchers. But Stach says Symbolics has been able to maintain a technological lead, which will enable it to grow by selling its products to researchers and advanced systems developers.

If past experience is any indication, it's a good bet that these Up & Comers will appear among the top-ranked vendors next year. Four of last year's Up & Comers achieved that distinction this year. ☐

UP & COMERS

Company	'85/'84 Growth (%)	'85 (000)	'84 (000)
Iomega Corp. (Stamford, CT)	123.9	$115,515	$51,600
Sytek Inc. (Mountain View, CA)	115.9	95,000	44,000
Stratus Computer Inc. (Marlboro, MA)	90.2	80,164	42,140
Symbolics Inc. (Cambridge, MA)	72.1	90,805	52,758
3Com Corp. (Mountain View, CA)	60.2	52,000	32,458
Digital Comm. Assoc. Inc. (Norcross, GA)	54.2	104,113	67,537
Ashton-Tate (Torrance, CA)	52.6	104,771	68,654

To qualify as a Computer Decisions Up & Comer, vendors must have marketed a general data processing product, had more than $50 million in revenues for 1985, and experienced a sales growth rate of at least 50 percent over 1984's.

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YEARNING FOR THE GOOD TIMES

For some vendors on the *Computer Decisions* 100, sales did not slump last year, they plummeted. Micromaker Commodore International Ltd. heads the list of poor performers, with fellow micro vendor Apple Computer Inc. not far behind. The bottom fell out of the home computer market at the same time both vendors discovered few corporations willing to purchase non-IBM-compatible micros in large quantities.

Commodore is gambling that its new micro, the Amiga 1000, can turn both the home market around and spark corporate interest. But despite receiving critical acclaim for its multitasking, graphics, and audio capabilities, the Amiga has suffered from a lack of available third-party software.

Apple has also discovered it's difficult to go it alone. Corporate users are not flocking to buy Apple's Macintosh.

The dominance of the IBM Personal Computer has hit office systems vendors equally hard. Seeking the versatility and low-priced performance of micros, users have turned away from traditional word processing systems, causing Wang Laboratories Inc., CPT Corp., and NBI Inc. to each suffer a drop in sales and earnings.

The price/performance advantages of smaller systems have also struck a blow to old-line computer-aided design and manufacturing vendors.

Another market particularly hard hit was plug-compatible peripherals. Control Data Corp. and Storage Technology Corp. are struggling to survive after IBM introduced its 3380 double-density disk drive.

Another industry giant delivered a body blow to vendors of private-branch exchanges. AT&T introduced an upgrade to its PBX system, clobbering sales to Northern Telecom Inc. and Intecom Inc., among others.

Those who were hardest hit by the computer slump of 1985 have already recognized, "downsized," and refocused on traditional strengths to face the challenge ahead. They face tough fights as the slow demand that cooled dp markets last year continues. Unless industry-wide demand begins to boom, 1986 will leave these vendors yearning for good times once again. ☐

HARDEST HIT

Company	'85/'84 Growth (%)	'85/'84 Rank
Commodore International Ltd.	−34.0	22/13
Datapoint Corp.	−30.9	39/28
CPT Corp.	−22.0	87/63
Computervision Corp.	−20.6	36/31
Diebold Inc.	−16.8	82/60
Storage Technology Corp.	−16.7	26/20
The Racal Corp.	−13.9	45/40
Paradyne Corp.	−12.9	50/45
NEC Information Systems Inc.	−8.0	70/57
Dun & Bradstreet Corp.	−7.7	99/82
Northern Telecom Inc.	−7.7	29/25
Apple Computer Inc.	−7.6	10/9
Intecom Inc.	−6.1	94/80
Tektronix Inc.	−5.1	41/39
Schlumberger Ltd.	−4.9	60/51
Data General Corp.	−4.4	14/12
NBI Inc.	−2.8	72/64
General Electric Co.	−2.3	21/18
Control Data Corp.	−0.3	7/5
Wang Laboratories Inc.	0.3	8/8

Acknowledgements: *The Computer Decisions 100 is ranked by data processing revenues as defined below for the 12 months ending Dec. 31, 1985. If a corporation has an unusual fiscal year, revenues from the four quarters ending before December are used.*

Only vendors that primarily sell directly to end users were ranked among the Computer Decisions *100. Vendors that primarily sell to original equipment manufacturers were excluded. Also excluded were revenues derived from internal sales.*

Wherever possible, Computer Decisions *attempted to obtain information directly from vendors. For those corporations who did not provide assistance,* Computer Decisions *turned to knowledgeable analysts.*

Data processing revenues are defined as the sale or rental of mainframes, minis, micros, disk and tape drives, other peripherals, CAD/CAM/CAE systems, word processors, data communications equipment, such as modems, multiplexers, and digital and data PBXs. Also included are software, maintenance, data processing services, and power and environmental control equipment sold specifically for use in data centers.

Excluded are revenues related to common-carrier communications, electric and electronic typewriters, electronic cash registers, instrumentation, semiconductors, board-level computers, printed circuit boards, automatic test gear, forms, papers, and revenues derived primarily from leasing and retail operations.

Computer Decisions *is indebted to the following market researchers, brokerages, and consultants for their assistance: International Data Corp., Framingham, MA; Dataquest, Cupertino, CA; Northern Business Information, New York; Infocorp, Cupertino, CA; Future Computing, Dallas; Magnetic Media Information Services, Chicago; Disk/Trend Inc., Mountain View, CA; Yankee Group, Boston; Interconsult Inc., Cambridge, MA; Frost & Sullivan, New York; Drexel Burnham Lambert Inc., New York; Smith Barney, Harris Upham & Co., New York; Paine Webber Inc., New York; Prudential Bache Securities Inc., New York.* ☐

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COMPUTER DECISIONS.

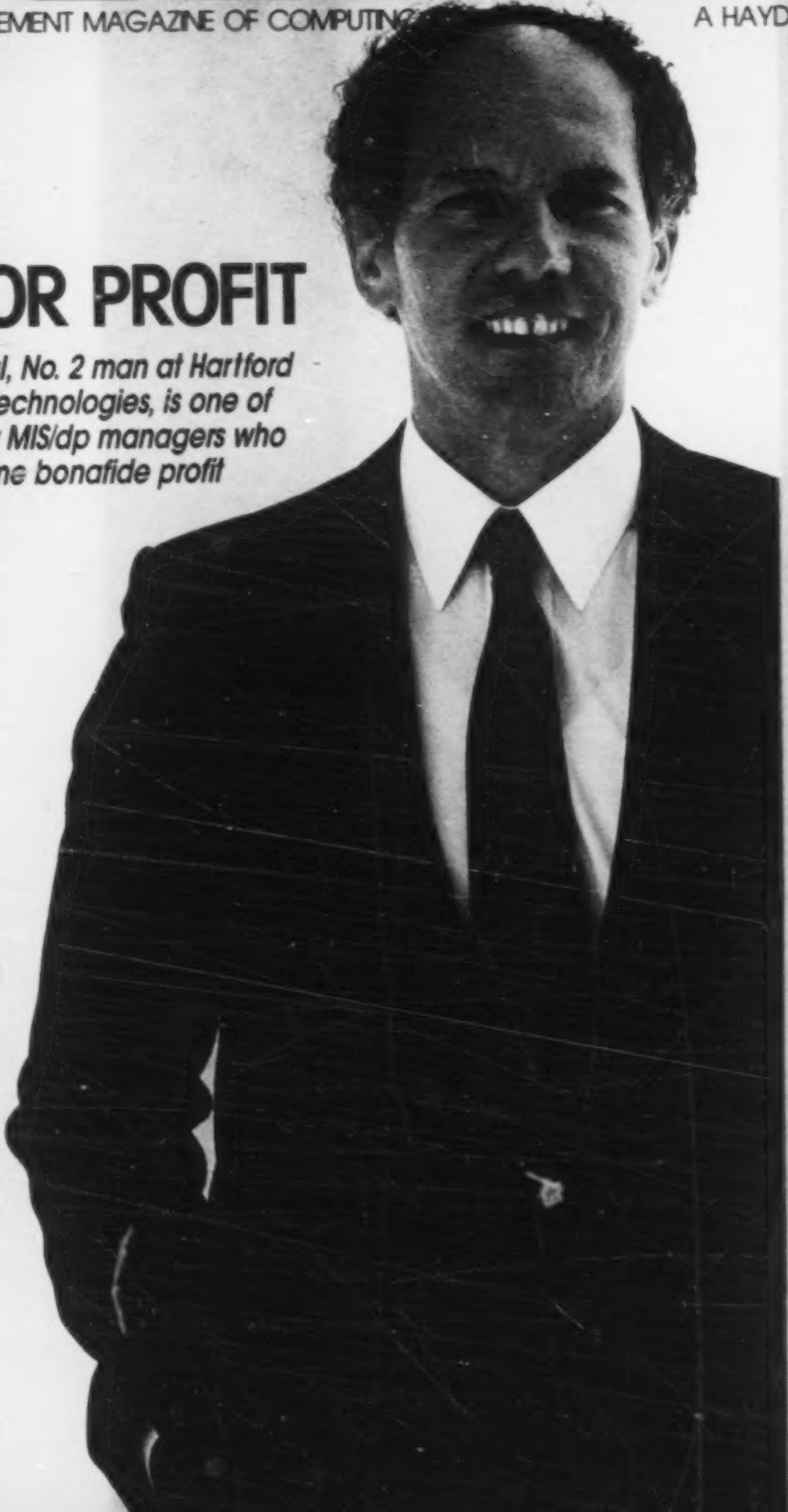
JUNE 30, 1986

THE MANAGEMENT MAGAZINE OF COMPUTING

A HAYDEN PUBLICATION

DP FOR PROFIT

Peter Daboul, No. 2 man at Hartford Integrated Technologies, is one of a select few MIS/dp managers who have become bonafide profit seekers.



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Cover Photo: Ted Hardin

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current law to 36 percent under the House bill, and 33 percent under the Senate proposal. Also, the Senate bill—which many economists give the greater chance of passage—is designed to restrict tax shelters and encourage investments to improve business profits and productivity.

"A cut in [corporate] tax rates should mean greater resources for investment," says Christopher Petruzzi, assistant professor of taxation at New York University. "And some types of business investments will be better off if tax shelters are restricted. There should be a shifting of resources away from real estate and other tax shelters toward investments that will increase profits and productivity. What better to invest in than computers?"

Members of the Computer and Business Equipment Manufacturers Association (CBEMA) are hoping businesses will agree. "Restricting tax shelters will stop corporations from investing for tax purposes," says Ted Heydinger, vice president of CBEMA. "Our members will benefit from that. Businesses need our equipment."

Tax reform will also affect leasing rates. Some observers expect rates to rise proportionately higher than the net cost of purchasing equipment. Now, lessors sell the tax advantages they receive when purchasing equipment to outside investors, and pass the benefits on to users in the form of lower rates. The Senate bill in particular places additional limitations on such "passive investing"—purchasing property to obtain the tax benefit without directly participating in its use.

That means much of the benefit from depreciation will no longer be passed on to third parties, and the pool of tax-sheltered investors could dry up, says Burton Carlson Jr., head of Arthur Andersen's capital recovery specialty team, in Detroit. Higher leasing rates will result, as competition for available investors increases the cost of financing purchases, says Carlson.

Harvey Shrednick, vice president of information services at Corning (NY) Glass Works, says he expects leasing and purchase prices to rise at about the same rate. Corning leases most of its computer systems. "But I may be able to negate any differences between lease-vs.-buy pricing," says Shrednick. "Lease rates are negotiable. Some of the lessors I deal with have indicated that we will be able to work it out."

One consultant believes a lack of passive investors may send remarketed equipment to the scrap yard faster. Frederic Withington, a consultant with Arthur D. Little, Cambridge, MA, suggests that without outside investors seeking a payoff from the initial lease, lessors will have less reason to maintain equipment.

That will only apply to lessors that do not remarket equipment, says John Vosicky, chief financial officer for Comdisco, a Rosemont, IL-based lessor. "We won't have as many competitors making deals because they won't have the resources to remarket the equipment. We will see a purer form of business." For Comdisco, which Vosicky says makes most of its money by remarketing equipment, that's good news.

Although the consensus is that the cost of procuring computer equipment will rise, how long that cost hike will last and its long-term effect on the depressed computer market are unknown. "Every business will look a bit closer at its needs," predicts Withington, "which may cause 5 percent fewer purchases overall."

But James Shanahan, senior tax manager at Price Waterhouse & Co., New York, points out that although the expense of buying computers may rise, so will the income generated by their purchase. "A manager should not be asked to cost-justify computer purchases in the same manner as before," says Shanahan. "Other factors, such as lower tax rates and additional profits, will have to be considered before a decision is made."

—Lee Keough

HONEYWELL FIGHTS BACK WITH NEW MINI

Analysts say the new DPS 6 Plus line of minicomputers from Honeywell Inc. gives current users a solid growth path. The new line should halt erosion of the Minneapolis-based vendor's small market share, but probably won't boost it, they add.

The DPS 6 Plus series is part of a general overhaul of Honeywell's mini and mainframe lines. Bull, the French computer maker of which Honeywell owns a small share, is developing a smaller machine with the same architecture as the DPS 6 Plus to compete with the MicroVAX II from Digital Equipment Corp. (Maynard, MA), according to Paul Derby, vice president and general manager of Honeywell's Small Computer Products division in Billerica, MA. Honeywell expects the new machine to be ready next year. Derby adds that upgrades are being developed for the the DPS 7 and DPS 8 computer series. Further, the NEC 1000 from Japanese manufacturer NEC Corp., sold by Honeywell as the DPS 90 series, will soon be upgraded.

Users of Honeywell's older DPS 6 minis hail the new machine. "The DPS 6 is a good machine and the time is right for a replacement," says Ted O'Neill, computer technology consultant for General Electric Corporate Information Systems, a large Honeywell user based in Bridgeport, CT. The line is rated at between 1 million instructions per second and 25 MIPS.

The new line of 32-bit virtual memory machines provides the same power as the DPS 6 for less money and in a box one half the size. Honeywell promises complete compatibility between the DPS 6 Plus and DPS 6 peripherals. Derby says Honeywell will contin-

(Continued on page 26)

Honeywell touts the price/performance ratio of its new machines.

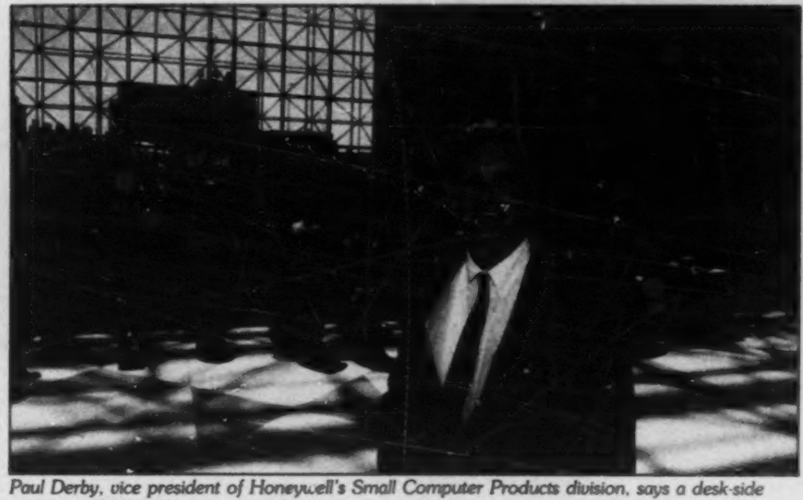


Photo by Robin Bowman

Paul Derby, vice president of Honeywell's Small Computer Products division, says a desk-side version of DPS 6 Plus is expected next year.

(Continued from page 22)

ue to manufacture the DPS 6 as long as customers demand it, but anticipates a phase out over the next year or two. Honeywell adds that the new machines will run all DPS 6 software as well as software written for 32-bit virtual hardware, such as the Oracle relational database management system from Oracle Corp. (Belmont, CA).

The DPS 6 Plus will be able to accept coprocessors to allow the simultaneous processing of applications under different operating systems, such as Bell Labs' Unix, says Bill Gould, the Honeywell small systems group's vice president of engineering. The new machines will be able to handle up to two coprocessors, including the 80286 chip from Intel Corp. (Santa Clara, CA) and the 68000 chip from Motorola Inc. (Schaumburg, IL). A Unix coprocessor will be available the third quarter of next year. Honeywell gave no release date for the 80286 coprocessor.

The new series "brings a dated product line up to the functionality of DEC and Data General lines," says Michael Geran, vice president of research for E.F. Hutton & Co. Inc., New York-based financial-services organization. Virtual memory, for example, is already standard on most 32-bit minis, Geran says. He adds that the ability of the DPS 6 Plus to accept coprocessors is not unique. The Eclipse minis in the Desktop Generation series from Data General Corp. (Westboro, MA), for instance, accept Intel chips as coprocessors.

The big news, says Honeywell, is in the price/performance ratio of its new machines. For example, the new DPS 6 Plus Model 411, a single-processor machine rated at 1.1 MIPS, costs $158,000 in a configuration for 19 users that includes 4 Mbytes of main memory, two 295-Mbyte disk drives, a backup tape drive, a 300 line-per-minute printer, the operating system, and Cobol. The same configuration for an old DPS 6/85-1, rated at 1.2 MIPS, costs $171,000. Honeywell says a comparably configured DEC VAX 8200 costs $190,000, and an IBM System/36 with 2 Mbytes of main memory costs $149,000.

But some analysts say Honeywell's price/performance ratio is no breakthrough. "This announcement brings Honeywell up to price/performance parity with the competition," says Alex Nedzel, managing associate with Index Systems Inc., a Cambridge, MA, consultancy. "The company is still an underdog as far as market share is concerned."

Still, some analysts are impressed with Honeywell's cross-vendor connectivity and communications. According to Joe McGrath, an analyst with the Gartner Group Inc. (Stamford, CT), Honeywell's new line supports several standards, including Open Systems Interconnection and Manufacturing Automation Protocol, as well as Ethernet and token-ring local-area networks. Support for Unix will make the DPS 6 Plus attractive to government users, he adds.

The first models in the DPS 6 Plus line, the 410 and the 420, are schedules for September delivery in single- or dual-processor configurations, with each processor representing about 1 MIPS of power. Four-processor models are expected late this year or early next year. The 410 and 420 support up to 50 and 150 users, respectively, and are available with up to of 16 Mbytes and 64 Mbytes of main memory. The memory capacity of the current DPS 6 models ranges from 4 Mbytes to 16 Mbytes. Honeywell also announced a new operating system, HVS 6 Plus, for the virtual memory and multiprocessor functions of the new computers. —*Anita Micossi*

MICRO SOFTWARE LEADERS

1. Lotus Development Corp., Cambridge, MA	$225,526,000
2. Microsoft Corp., Redmond, WA	162,630,000
3. Ashton-Tate, Torrance, CA	110,397,000*
4. Digital Research Inc., Monterey, CA	45,179,000
5. Micropro Int'l., San Rafael, CA	40,061,000
6. Software Publishing Corp., Mountain View, CA	31,664,000
7. Borland Int'l., Scotts Valley, CA	30,000,000
8. Autodesk Inc., Sausalito, CA	28,425,000
9. Broderbund, San Rafael, CA	25,000,000
10. Satellite Software Int'l., Orem, UT	22,983,000

**Not including acquisition of Multimate Int'l.*

1985 revenues supplied by Softletter, Cambridge, MA.

C4485

The PBX-CPU connection • Beyond presentation graphics

Coping with IBM's rising maintenance fees

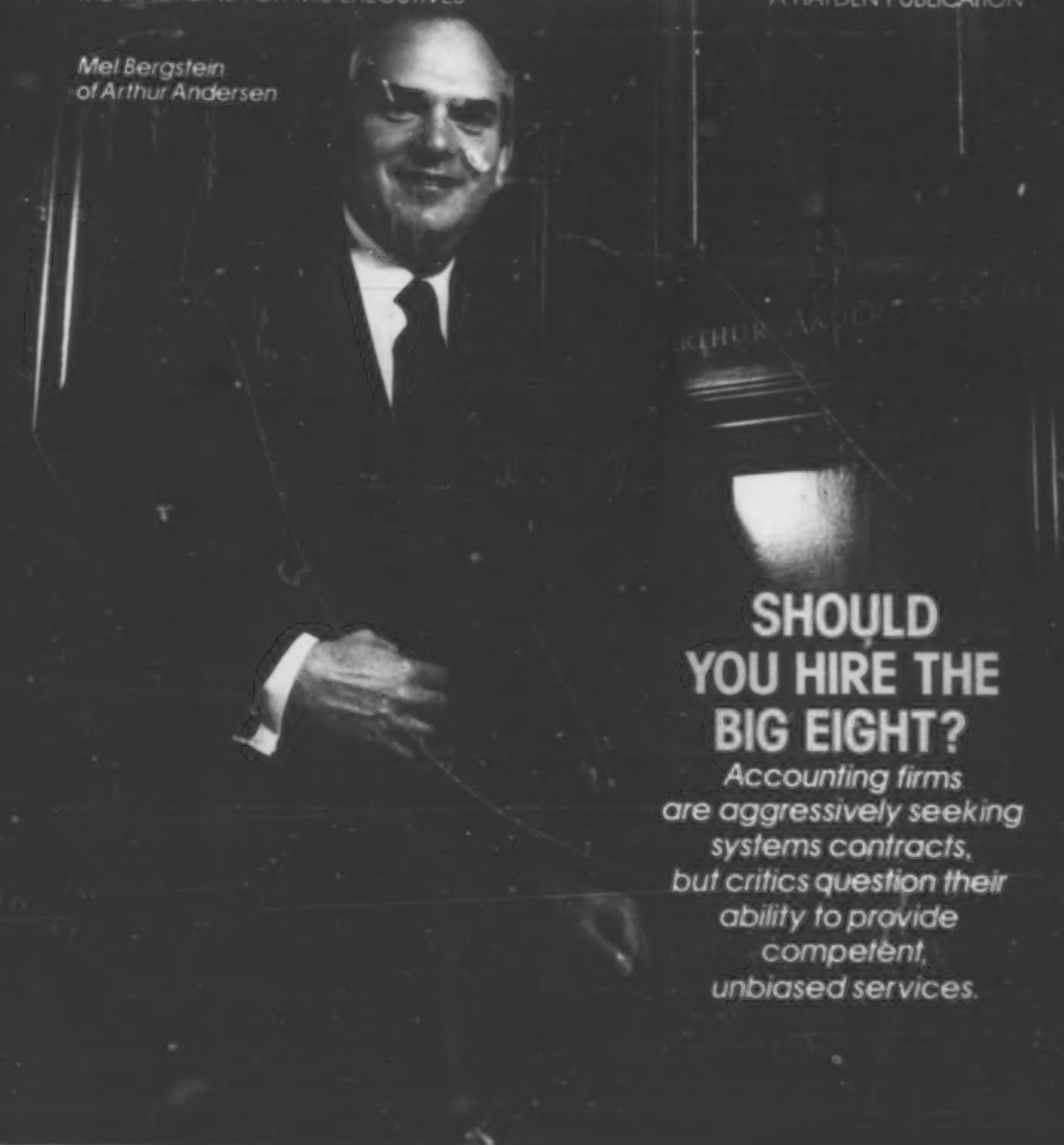
COMPUTER

DECISIONS

THE MAGAZINE FOR MIS EXECUTIVES

JULY 29, 1986

A HAYDEN PUBLICATION



Mel Bergstein
of Arthur Andersen

SHOULD YOU HIRE THE BIG EIGHT?

Accounting firms are aggressively seeking systems contracts, but critics question their ability to provide competent, unbiased services.

Volume 18 Number 16

COMPUTER
decisions

Copies printed: 182,839

July 29, 1986

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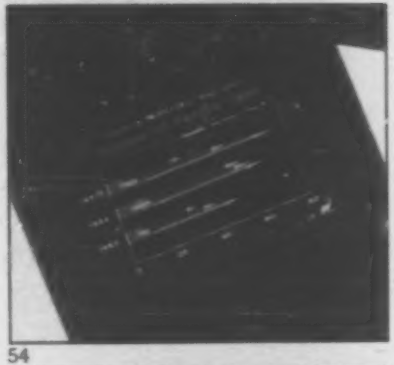

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Should you hire the Big Eight?/*David Kull* What are accounting firms doing in information systems development? Plenty. And that makes some observers nervous.

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61 Dp and the open office/*David Whieldon* Like library code modules, open-office furniture can be assembled and reassembled or stored for another time and place.

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33 Application/General Mills takes the Hyperchannel bus.

34 Strictly Software/Is mini-tuning an unrecognized opportunity to meet users' current *and* future processing needs?

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42 Following the Leaders/Datapoint gets points for making big strides across a credibility gap and rocky takeover terrain.

44 Large Systems/Coping with rising IBM maintenance fees.

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67 Inside Mfg./More than meets the eye in machine vision?/A new model in Hewlett-Packard's Spectrum series provides a foundation for CIM.

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Cover Photo: Richard Derk

would have to train their employees only once to use any of the dictionaries.

Besides providing for this portability of skills, the proposal also calls for the portability of information between dictionaries. A dictionary-to-dictionary interface would allow the automatic transfer of all or part of a dictionary from one standard dictionary to another. Without a standard interface, such exchanges require customized interfaces between products or the rekeying of data. The dictionary-to-dictionary interface would also allow organizations to change dictionaries easily or share a dictionary's contents between installations using different dictionaries.

Pansophic Systems Inc. (Oak Brook, IL) has proposed an extension to the IRDS standard that would further reduce redundancy. Pansophic proposes the development of a standard application-to-dictionary interface that would allow applications to access different data dictionaries directly. Under the current proposed IRDS standard, an application would have to go through its own data dictionary to access a separate dictionary. David Carpenter, Pansophic's manager of product development and a representative to the X3H4 committee, says the software interface would be useful for products like Telon, Pansophic's application development system. Telon has an embedded dictionary, Carpenter says, "and we can write an interface to any other dictionary." However, such interfaces are difficult and expensive to develop. A standard application-to-dictionary interface would allow Telon and any other dictionary-based package to access any IRDS.

David Jefferson, manager of the database architecture group at NBS, says such access would allow a dictionary to actively participate in compiling programs and even to provide information when a program runs. While compiling a program, for example, a compiler could pull out required record or data element definitions from the appropriate dictionary. Without such a feature, programmers would have to write definitions into each program.

According to a source close to the IBM repository development group, the IBM repository would actively participate in the generation and regeneration of MVS systems and subsystems, such as DBMSs and teleprocessing monitors. To generate a system, a configuration's particular hardware and software elements must be defined. Changes to hardware or software—a new release of CICS, for example—require that the system be redefined. These jobs require considerable programmer effort and management organization, particularly since the architectures of the various subsystems don't mesh neatly.

At a recent conference sponsored by the Gartner Group Inc., a Stamford, CT, consultancy, Marilyn Bohl, product manager for IBM's DB2 relational DBMS, said DB2 will manage the repository. Bohl's revelation raises two questions: Will the repository require a full-function copy of DB2? And will users need the repository to generate MVS systems in the future?

Because the repository itself will be a database, its maintenance should require the same DBMS functionality as any other database; consequently the repository should need a complete version of DB2. In that case, if an organization installed the repository, the only bar to using the accompanying copy of DB2 for other databases would be some form of limited licensing agreement. If the repository were required for system generation, DB2 would be required for the system. At

(Continued on page 20)

TOP 10 COMPUTERS

(Based on dollar value of U.S. installations)

SYSTEM	RANK: 7/85	RANK: 1/86	TOTAL VALUE*	SYSTEMS INSTALLED	PRICE**
IBM 3081	1	1	$4.653	1,551	$3
IBM 3084	2	4	4.076	627	6
IBM 4381	3	5	3.781	3,781	1
IBM 3083	4	3	3.458	1,729	2
IBM 3090	5	-	3.432	369	9.3
DEC VAX 11/70	6	2	3.353	16,765	.2
IBM S/36	7	7	3.196	39,947	.08
IBM S/38	8	8	2.149	8,956	.24
IBM 4341	9	6	1.886	5,240	.36
HP 3000	10	10	1.392	13,924	.1

Installed base x purchase price in billions
**Purchase price in millions*

Source: Computer Intelligence Corp.

C4485-1A

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AUGUST 26, 1986
THE MAGAZINE FOR MIS
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VIDEOCONFERENCING EXPLODES

Reduced costs make
"eyeball-to-eyeball"
communications
ever more attractive,
says Aetna MIS chief
Irwin J. Sitkin.

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4GL training challenge

The spread of SQL

Teleconference-data links

Digital fax arrives

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August 26, 1986

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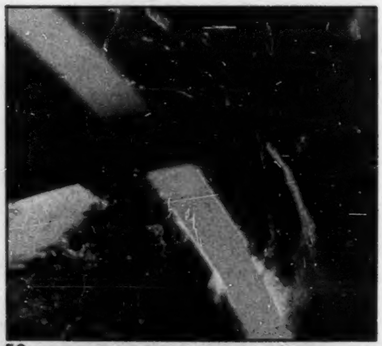

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Cover Photo: Rob Gray

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27 Strictly Software/SQL as a standard promises a simpler life for MIS/dp managers, but portability remains a problem.

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34 Following the Leaders/TRW's aggressive acquisition policy proves that diversity breeds success.

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48A Inside Mfg./Cell controllers bridge the CIM political gap. Real-time Unix promises to unify the factory floor.

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in exactly what they see," she says. Universal Information Capture's China bureau employs about 500 workers.

Not surprisingly, domestic data entry services downplay the benefits of offshore services. Besides longer turnarounds, foreign services use outdated equipment, notes Walter Vukas, president of American General Service Corp., a Dearborn, MI-based data entry service that uses only domestic data entry operators. Vukas says he has sold 18-year-old data entry machines to a service bureau in the Philippines.

Many corporations don't want their data going off their premises, much less out of the country, Vukas says. "Many corporations have to trust you," he says. "They want to make sure you are protecting their interests." Vukas, who says American General Service provides data entry services to the big three automakers, remembers when one executive made an unannounced inspection of Vukas' data entry operations at 2 a.m. to check if any data were unsecured on desks or terminals.

Gil Morgan, president of International Computer Services (Miami Lake, FL), which has been using data entry operators in Jamaica since 1964, dispels the security issue. "Some clients actually feel more secure by having their work done abroad," he says. "They believe foreign workers are less inclined to be interested in the confidential subject matter in their files." Morgan also says offshore data entry isn't any riskier than domestic work. "A plane with records can crash on a domestic as well as an international flight," he says.

Walz says cheaper satellite data communications may raise overseas data entry to about 25 percent of the U.S. market. However, both she and Vukas say the future of data entry lies in such underdeveloped technologies as barcoding, optical character recognition, and voice recognition. As these technologies develop, domestic data entry costs will drop to the point at which foreign data entry operations will lose their price advantages, they say. —*Anita Micossi*

COMPUTER MONITORING, WITH FEELING

As computer monitoring of workers—especially data entry operators—increases, labor groups are using the issue in battles with management and are lobbying for legislation to eliminate monitoring.

The Computer and Business Equipment Manufacturers' Association (CBEMA), Washington, offers the following suggestions to data entry managers to ensure that computer monitoring is beneficial to both employees and management.

- Give employees access to their records and regular, supportive feedback.
- Measure only those items essential to meet organizational goals.
- Anticipate individual differences in needs for length and number of breaks or in work speed.
- Be careful about using statistics to inspire competition. Systems in which all individual production scores are circulated or posted can backfire by making employees graded "below average" angry and tense.
- Once reasonable production rates are established, employees tend to resent managers who inch up standards so that operators have to work harder to achieve the same rate of pay. ☐

DATA ENTRY MANAGERS FLEX TO A POINT

Although corporations seem more willing to offer flexible hours and a four-day work week to data entry workers, they are still holding the line on salaries.

Of the 102 corporations recently surveyed by the Data Entry Management Association (Stamford, CT), 14 percent offer four-day work weeks and 35 percent offer flexible hours, an increase of 10 percent and 12 percent, respectively, over 1984 findings. However, the average salary for data entry operators increased only about 2 percent, to $14,238.

Norman Bodek, president of the association, says the continuing shortage of data entry operators has keyed the increase in the four-day work week and flex-time. "Corporations are trying to accommodate employees to keep them and attract them to data entry," says Bodek. "Large companies can afford to be more flexible in scheduling time because they have larger head counts to work with." Flex-time is popular because about 95 percent of data entry operators are women who may be caring for children, Bodek notes.

For its survey, DEMA contacted 72 large corporations with data entry departments and 30 data entry service bureaus. ☐

DATA ENTRY DATA

	1983	1984	1985
Shops with 4-day work week	7%	4%	14%
Shops with flextime	34%	23%	35%
Unionized shops	13%	11%	18%
Average pay of operator	$13,630	$13,955	$14,238
Average keystrokes per hour	11,804	11,400	11,944
Average pay of data entry manager	$28,323	$28,634	$29,386

Source: 1985 survey by the Data Entry Management Association

C4485-1-A

SEPTEMBER 23, 1986

- Environment control, front and center
- OA-factory links
- LU6.2 loves Irma
- Ethernet-host ties
- Tuning micro DBMSs

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Roger Schelm, vice president of applied research/expert systems at Cigna.

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About the cover: The 1922 Ahrens Fox piston pumper fire engine on the cover is part of the Cigna Museum collection in Philadelphia. It was used by the West Reading, PA, fire department from 1922 until 1960, and is still in working order.

Cover photo by David Wells

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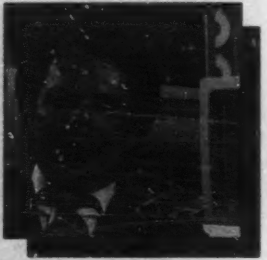

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Copies printed: 182,187

Cheaper IBM ASCII terminal . . . Continuing its policy of offering low-priced terminals, IBM expanded its 316X line of ASCII terminals with the 3162, a $645 terminal for the IBM Series/1 mini, the System/88 fault tolerant machine, and IBM Personal Computers, including the RT PC.

Priced about the same as the 3161 terminal, the 3162 offers a wider screen, displaying up to 132 characters per line. With four additional plug-in cartridges priced between $40 and $60, the 3162 can be configured to emulate the a wide range of terminals including the VT-220/100/52 from Digital Equipment Corp. (Maynard, MA) and the Models 50 and 60 Plus from Wyse Technology (San Jose, CA). ☐

Quick exits for MIS/dp managers . . . Are MIS/dp managers descendents of a nomadic tribe? According to Herb Halbrecht, a Stamford, CT-based executive recruiter, the average MIS/dp director stays at a job only about three to four years and then moves on. Halbrecht blames the high turnover on rapid technology changes, competition for top MIS/dp talent, and a failure to appreciate MIS/dp's role in a corporation's business. For the most part, Halbrecht says, successful MIS/dp executives are "smart politicians" who are able to sense what users want and not take credit for every success. Success doesn't necessarily lead to longevity, however; Halbrecht adds that successful managers often leave for better jobs in other corporations. ☐

LANwriter debuts . . . The 645E Memorywriter from Xerox Corp. (Stamford, CT) is the first electronic typewriter able to connect to a local-area network, according to the vendor.

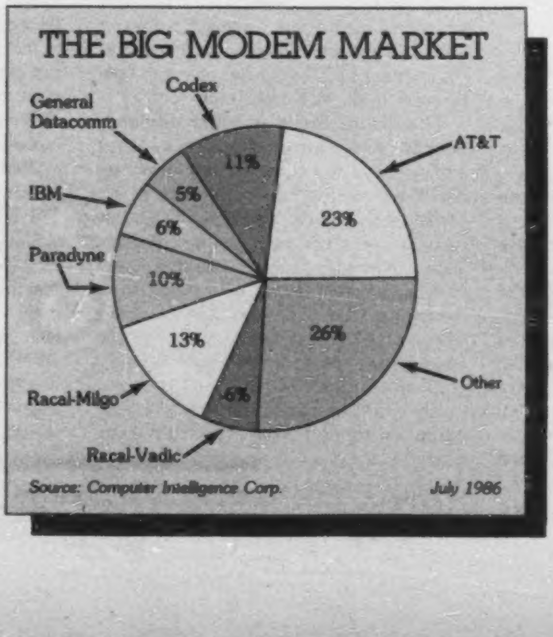
The $4,395 645E can be connected to a Xerox LAN or any other Ethernet network. With the Ethernet connection, the Memorywriter can access documents from and distribute them to Xerox computers on the network, including Model 860 word processors, 8010 and 6085 workstations, and 6060 Series computers. The new typewriter can also take advantage of a range of laser printers that can be attached to the network. ☐

LED printer to tackle big assignments . . . Analysts say the new Kodak Ektaprint 1392 printer from Eastman Kodak Co. (Rochester, NY) is the only nonimpact electronic printer that uses a light-emitting diode (LED) array image writer and operates at speeds (up to 92 pages per minute) acceptable for high-volume use.

Kodak's new offering can be used with the Kodak Ektaprint Electronic Publishing System (Keeps), a document-creation system introduced last year, or with IBM mainframes. The printer's speed is in the same ballpark as high-volume laser printers such as the IBM 3800 and the Xerox 9700, says Cathy Dingman of CAP International, a consultancy in Marshfield, MA. Dingman says LED printers are cheaper to operate and maintain than laser printers because they have fewer moving parts. The LED mechanism in the Kodak 1392 printer weighs about 10 pounds and can be removed easily for maintenance or replacement.

The resolution offered by the 1392 printer (300 dots per inch) equals that available on laser printers. The 1392 holds up to 3,500 sheets of paper, which helps cut down on reloading time. Although an exact price was not available at press time, Kodak says its new printer will cost under $200,000. ☐

THE BIG MODEM MARKET



Source: Computer Intelligence Corp. *July 1986*

PBX upgrade from north of the border . . . Mitel Corp. (Kanata, Ontario) announced an upgrade for its Generic 1000 software, which converts its SX-200 analog private branch exchange to a full digital product. The software for the upgraded switch, which is based on the Integrated Services Digital Network, allows documents to be exchanged electronically during a voice conversation. The digital SX-200 will sell for $430 to $620 per line and will support up to 480 ports. Mitel also announced the Superset family of telephones, which also support ISDN standards. ☐

Multiuser mini micro . . . A new IBM Personal Computer clone from Sperry Corp. (Blue Bell, PA) supports up to five users under the Xenix System V operating system. Called the PC/microIT because of its small footprint (15 inches by 15 inches), the new clone costs only $2,345 in the basic version, which includes 512 Kbytes of RAM. An expanded version, with the same 512K bytes of memory plus a 20-Mbyte hard disk, costs $3,590. Memory can be expanded to 1.5 Mbytes without using an expansion slot, and up to 3.5 Mbytes using a single slot.

The PC/microIT will be compatible with a new workstation from Memorex Corp. (Santa Clara, CA) that will function as an IBM 3270-based micro-to-mainframe link. The compatibility provides early fruit from the merger of Sperry and Burroughs Corp. (Detroit), which owns Memorex. ☐

(News continued from page 30)

SOFTWARE AND SERVICE INDUSTRY

ROOKIES BREAK INTO THE BUSINESS

More computer software and service vendors are being acquired by corporations outside the industry, according to a report published by Broadview Associates (Fort Lee, NJ).

The large corporations scooping up smaller high-tech firms typically have deep pockets and can lend financial and marketing assistance. But they expect return on their investment, analysts say.

Of the record 144 corporations involved in deals during the first six months of this year, 53 were newcomers to the industry, compared with 31 newcomers in the first half of last year, according to the biannual Broadview Association/Adapso (Association of Data Processing Service Organizations) Index. The total dollar value of all transactions reached a record high of $1.9 billion, up 124 percent from the $846 million in the first half of last year, according to the index.

Newcomers are attracted to the industry because technology stock is undervalued, says Bruce Hadburg, an analyst with Mountain View, CA-based Input Inc. "The price is right, the market overall has done well, plus, it's cheaper to buy someone else's capability than to start it yourself," he says.

But some analysts question whether new entrants to the industry will be able to make the transition or understand the software business enough to succeed. Ted Faigle, an associate at IndexSystems Inc., a market researcher in Cambridge, MA, recalls instances in which corporate cultures clashed. In one case, Exxon Corp. (New York) acquired several small high-tech firms a few years ago, but employees started to leave because they weren't used to the management style of an oil company. Earnings collapsed, and Exxon's high-tech portfolio is limited to one printer manufacturer.

"Computer software and services is an attractive market right now, which is causing outside companies to enter," says Faigle. "But it's a very competitive industry, and the consolidation of strong competitors already existing in the market will make it difficult for new entrants to gain access to distribution channels."

George Grodahl, a partner at Broadview, believes new entrants are not naive to the differences in corporate styles. Most acquirers consider the purchase an investment, and intend on keeping a "hands off" approach, he asserts. As an example, he cites the acquisition by Ameritech Inc. of software vendor Applied Data Research Inc., Princeton, NJ. Grodahl says Applied Data Research continues to run the way it ran before the Chicago-based Bell regional holding company bought it.

The Broadview/Adapso Index also indicates that divestitures of existing software and service companies is up sharply. Divestitures accounted for 42 percent of the sales, compared with 27 percent last year. Grodahl attributes the increase to corporate decisions to focus on one or a limited number of services, streamline an acquired company by divesting operations that don't fit the central strategy, raise money to fund other operations, or simply quit the business.

"Selling a company isn't a sign of weakness or failure," Grodahl asserts. "Companies don't buy problems or acquire companies they perceive to be bailing out. They invest in a company, strengthen it through research and development, and then expect a return on investment," he says.

Can new entrants understand the software business?

Survival of the biggest is how Hadburg views the marked increase in divestitures. He believes smaller software and service organizations will disappear. "It makes economic sense," says Hadburg. "No longer can a two- or three-person company write an outstanding package and then successfully sell the product based on its merit alone. The game is being played on a much larger scale, and those that don't move up to that scale face going away."

Of the transactions reported in the first half of 1986, 24 percent involved micro software vendors, according to Broadview. Grodahl singles out the micro software arena as a buyers' market, attracting large software vendors that want to expand existing product lines without having to put up with the time and expense of development. The big three micro software houses—Lotus Development Corp. (Cambridge, MA), Microsoft Corp. (Redmond, WA), and Ashton-Tate (Torrance, CA)—are actively seeking to expand by buying the products of smaller houses.

Competition is yet another force spurring companies to merge. "Companies such as Cullinet Software Inc. [Westwood, MA] and Information Builders Inc. [New York], known for mainframe applications, are beginning to move into the micro arena and will be viewed as threats by the leading micro software companies," says Faigle. "For micro software vendors to maintain their leading positions and continue growth rates, they need to expand their product lines." —*Theresa Conlon*

BIG DEALS*

Company acquired	By	Price**
Quotron Systems Inc. *(Los Angeles-based securities quotation service)*	Citicorp *(New York-based banking and financial corporation)*	$680
Control Data's Ticketron division *(New York ticket service)*	Allen & Co. *(New York-based investment banker)*	$140
Applied Communications Inc. *(Omaha, NE, electronic funds transfer service)*	U.S. West Inc. *(Englewood, CO-based Bell operating company)*	$120
Deltak Inc. *(Naperville, IL-based dp training outfit)*	National Education Corp. *(Irvine, CA-based technical training corporation)*	$84
Display Data Corp. *(Hunt Valley, MD-based turnkey distribution systems maker)*	Convergent Technologies Inc. *(Santa Clara, CA-based computer maker)*	$59

*January through June 1986

**In millions

Source: Broadview Associates/ADAPSO biannual survey of software and service industry

Chart by Vincent J. Gallo

C4485-1-A

SEPTEMBER 30, 1986

SPECIAL ISSUE

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SOLVING THE MIS PLANNING PUZZLE

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For MIS executives, planning requires foresight, insight, a head for business—and the ability to put it all together.

DAVIDSON

COMPUTER DECISIONS

September 30, 1986 Volume 18 Number 21

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22 Workstations: Color them green. The RISC in MIPS ratings.

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30 Another micro boom ahead/A new generation of micros promises a mixed blessing for MIS/dp managers: Users' lives will be easier, but buying decisions will be tougher.

34 Mix-and-match networks/For communications managers, the future demands mixing a complex variety of network services and matching them to corporate needs.

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36 Get ready for R-DBMS/ MIS managers should prepare now to implement relational DBMSs and for the explosion of end-user applications that will follow, says an expert.

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40 Matching MIS to the business/The ways information flows through all levels of an organization have become the focus of a new strategic planning method.

44 Methods for the '80s/As business and systems planning converge, choosing a method that will be truly strategic becomes more complicated than ever.

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Cover illustration: Everett Davidson

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BUDGET BOOSTS

MIS/DP SPENDING CONTINUES UP

Spending on computers, software, and services by MIS/dp departments rose this year, according to a survey of Data Processing Management Association members. The average MIS/dp budget reported in the survey rose from $2.1 million to $2.6 million, almost a 29 percent increase over the previous year.

Seventy-five percent of respondents enjoyed budget increases this year, and only 7 percent suffered cuts. The remainder reported no change over the previous year.

The DPMA's survey, which covers members in large and small organizations in a variety of industries, provides a broad barometer of spending on information systems. Austin Weber, editor of *Comp-U-Fax*, a DPMA publication, says MIS/dp spending has been rising since the early 1980s, when DPMA began conducting surveys. "More and more companies are beginning to understand the force information systems can be," he says. "They are waking up to their competitors' use of computers to improve efficiency." He expects the trend to continue.

As expected, DPMA survey respondents spent the largest single portion of their budgets—39 percent—on salaries. However, this percentage was a slight decrease from the previous year's 40 percent figure. In descending order of importance, the other major spending categories were large systems hardware, 25 percent, software, 12 percent, micros and data communications, 7 percent each, office systems, 4 percent, training and staff development, 3 percent, and security, 3 percent. The reductions came in software, training, and security.

Many of these findings correspond to those of other surveys of MIS/dp budgets and spending. For example, the latest available quarterly survey of corporate spending from International Data Corp. (Framingham, MA) indicates a slightly higher percentage was spent on hardware, which includes large systems. (See chart.) IDC's survey respondents, however, spent only about 7 percent of their budgets on software, considerably less than the annual total reported in the DPMA survey. This finding could be the result of software price cutting and IDC's narrow focus on the first three months of the year.

The Diebold Group, a New York consultancy, whose biannual survey of MIS/dp spending is due out later this fall, the recent price wars among software vendors are temporary. Diebold projects continually rising costs for applications and systems software, particularly the latter, during the rest of the decade.

One of the factors in the increased spending on data communications charted by most surveys may be a growing number of links between micros and mainframes. Thirty-nine percent of the micros in sites covered by the DPMA's survey are linked to mainframes, and Weber believes the number is growing. DPMA hasn't collected data on micro-to-mainframe links in previous surveys, but Weber believes 25 percent at most of respondents to last year's survey had them.

A small but significant trend identified by the DPMA survey is the growth in end-user programming. Respondents reported that 13 percent of their programming workload will be handled by users in information centers, about double the amount of programming reported in the previous year's survey.

The largest expected annual increase in MIS/dp expenditures, however, is people. Technical specialists, predicts Diebold, will cost 16 percent more each year for the rest of the decade. This will come as little surprise to corporations developing sophisticated communications networks or systems using any one of a variety of "leading edge" programming languages. Already, corporations experimenting with expert systems are finding that programmers who understand Lisp are difficult to find and expensive to employ.

On the downside, Diebold projects a continuation of price reductions for computers and storage devices. The reductions apply to all sizes of computer, from mainframes to micros, and to mainframe disk drives and tape drives.

—Brian Shannon

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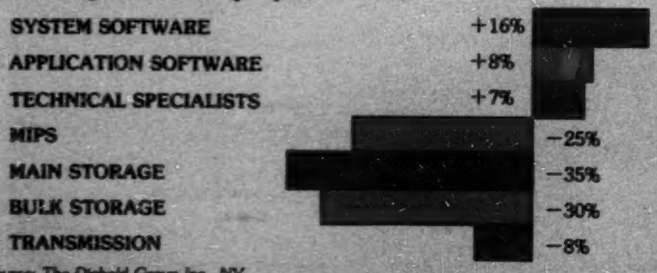
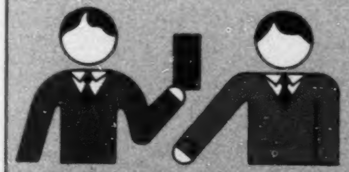
COST PROJECTIONS

Rate change of unit cost per year 1985–1990



Source: The Diebold Group Inc., NY.

WHERE THE MONEY GOES



U.S. information systems spending by category

First quarter 1986	All respondents	Budgets over $10 mil.
dp hardware	28.2%	28.4%
dp software	6.8	6.2
Communications	9.9	10.4
Office systems	3.6	3.6
Factory systems	2.5	2.8
Service bureaus	1.0	0.7
Other outside services	5.1	5.4
Salaries/benefits	35.7	35.5
Other operations	7.1	7.1

Source: International Data Corp.

Charts by Denise Barbieri

(Continued from page 12)

rate use during the next few years. Also, vendors expect new "writing" techniques to increase the maximum density of data storage on magnetic media, he says. On another front, storage costs may fall simply because vendors move their manufacturing operations offshore.

Projections about the future of technology are as valid as any other predictions: No one is sure about the future. In the case of future costs in information processing, says Roche, the factor most likely to send Diebold's projections to the dustbin is the decentralization of computing. End-user computing is the wild card in information systems planning. The effect of all this activity on mainframe demand, software costs, and mainframe disk capacity demands is, well, unpredictable.

—*Brian Shannon*

DASD VALUE COMPARISON

5,000-Mbyte capacity Vendor/Product	1986 Price/Mbyte
Storage Technology 8380-BE4	$19
NAS 7380-AE	$19-$23
IBM 3380-AE4	$24
Amdahl 6380	$16-$21

2,500-Mbyte capacity Vendor/Product	1986 Price/Mbyte
Memorex 3680	$26-$35
Storage Technology 8389-BO4	$25
NAS 7380	$24-$34
IBM 3380-AA4	$35
Amdahl 6380	$15-$28

Sources: Storage Technology Corp., National Advanced Systems, International Data Corp., Memorex Corp., Amdahl Corp.

REPORT CARDS

WHO'S BOSS? FOR MIS, IT'S FINANCE

High performance and constant change may be the watchwords in MIS/dp, but people change at a slower pace. Despite the movement toward strategic use of information resources, only a small percentage of MIS executives report to top management, according to a survey by the Data Processing Managers Association, Park Ridge, IL.

In a recent survey 66 percent of information executives said they still report to the heads of finance or accounting, a chain of authority consultants predicted would be replaced years ago. Only 15 percent of the respondents said they report to their chief executive officer. (See chart.) The DPMA concludes from the data that most corporations still treat their MIS departments as cost centers not vital to competitive positions.

DPMA did not determine how reporting relationships vary according to size of organization. However, Austin Weber, editor of *Comp-U-Fax*, the DPMA's newsletter, says MIS executives in larger corporations tend to report to executives higher in the organization than their counterparts in small organizations. Medium-sized corporations fall in the middle, with no clear trend in either direction, he says.

(Continued on page 18)

DATA PROCESSING SALARIES 1985-1986

Title	1985	1986	Change %	Real %
Vice president, MIS	$64-94*	$65-94*	+0.6	+0.8**
MIS Director	54-75.5	55-75.5	+0.8	+1.0
Systems & Programming				
Manager	$35-45	$38-46	+3.7	+3.9
Project manager	34-44.5	35.5-45	+3.2	+3.4
Systems analyst	33-40	33-41	+1.4	+1.6
Programmer analyst	25-33	26-35	+5.2	+5.4
Programmer	21-27	22-28	+5.2	+5.4
Technical Services				
Manager	$38-48	$39-49	+2.3	+2.5
Systems programmer	29-39	30-40	+2.9	+3.1
Data Base Support				
DB admin./manager	$34.5-43.5	$35-45	+2.6	+2.8
DB analyst	31-41	31-42	+1.4	+1.6
Telecommunications				
Manager	$34-40	$36-42	+5.4	+5.6
Telecom. specialist	31-36	33-38	+6.0	+6.2
Operations				
Manager	$30-39	$30-40	+1.4	+1.6
Shift supervisor	23.5-30	24-31	+2.8	+3.0
Operator	16.5-21	17.5-22.5	+6.7	+6.9
EDP Audit				
Manager	$33.5-44	$35.5-48	+7.7	+7.9
Senior	28-37	30.5-39	+6.9	+7.1

*Add 000.

**To determine the increase in real terms, compare the percent change with the CPI (Consumer Price Index), a measure of living costs based on changes in certain retail prices. The CPI for 1986 thus far is decreasing at an annual rate of −0.2%, based on the first seven months of the year, according to the U.S. Department of Labor. The CPI was +3.8% in 1985. For another comparison, see the accompanying chart for salary variations from the national average.*

Source: Robert Half International, Inc., NY, NY.

(Continued from page 16)

The survey was weighted toward large and medium corporations, each accounting for 35 percent of the responses.

The survey, which canvassed 1,000 executives in a spectrum of organizations, is the DPMA's first on the subject. The organization estimates that the number of MIS executives reporting to the CEO or chief operating officer is growing slowly.

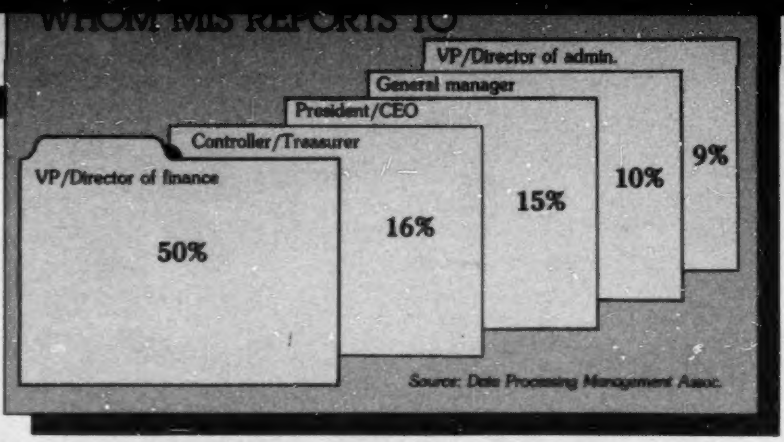
Weber believes the pace of change in reporting structures will accelerate in the future as young executives who are more comfortable with information systems move into positions of greater responsibility.

The study also found that 67 percent of the members questioned said their corporate information resources are centralized, rather than distributed, while 57 percent have MIS steering committees.

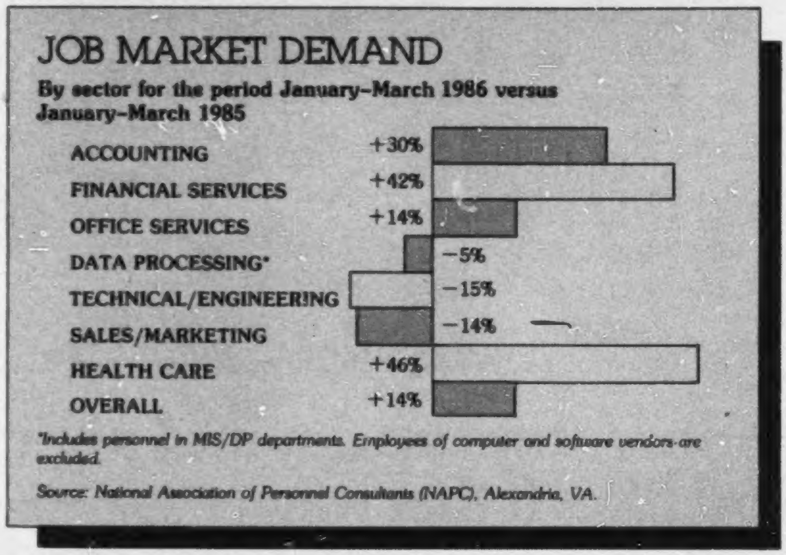
Respondents to the survey don't believe the slow changes in reporting structures mean MIS has earned a bad reputation with upper management. Sixty-five percent said MIS is viewed positively within their organizations. Fifty-nine percent said they are sufficiently paid relative to other executives with similar levels of responsibility. However, recent information on MIS/dp salaries indicates that the rate of increase for top MIS executives shrank.

—*Brian Shannon*

(Continued on page 22)

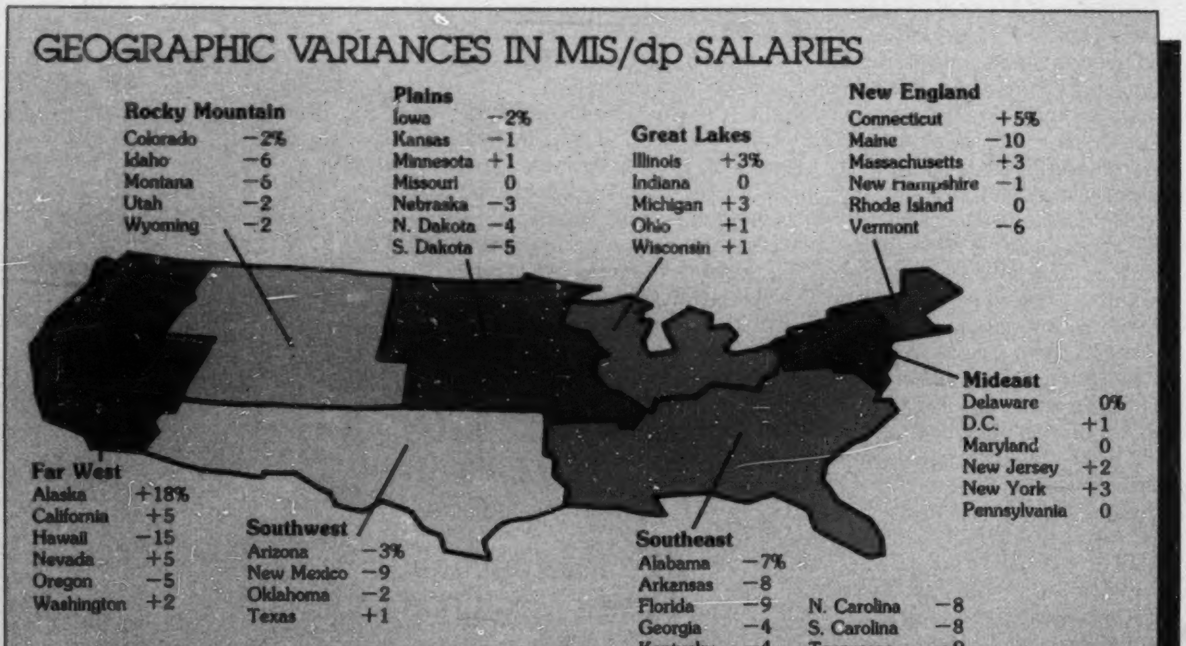


Source: Data Processing Management Assoc.



*Includes personnel in MIS/DP departments. Employees of computer and software vendors are excluded.

Source: National Association of Personnel Consultants (NAPC), Alexandria, VA.


GEOGRAPHIC VARIANCES IN MIS/dp SALARIES
Rocky Mountain
Colorado −2%
Idaho −6
Montana −6
Utah −2
Wyoming −2
Plains
Iowa −2%
Kansas −1
Minnesota +1
Missouri 0
Nebraska −3
N. Dakota −4
S. Dakota −5
Great Lakes
Illinois +3%
Indiana 0
Michigan +3
Ohio +1
Wisconsin +1
New England
Connecticut +5%
Maine −10
Massachusetts +3
New Hampshire −1
Rhode Island 0
Vermont −6
Mideast
Delaware 0%
D.C. +1
Maryland 0
New Jersey +2
New York +3
Pennsylvania 0
Far West
Alaska +18%
California +5
Hawaii −15
Nevada +5
Oregon −5
Washington +2
Southwest
Arizona −3%
New Mexico −9
Oklahoma −2
Texas +1
Southeast
Alabama −7%
Arkansas −8
Florida −9
Georgia −4
Kentucky −4
Louisiana −8
Mississippi −10
N. Carolina −8
S. Carolina −8
Tennessee −9
Virginia 0
West Virginia −9

Percentage variations from the national average. Source: Robert Half Int'l.

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OCTOBER 7, 1986

- Portables help sales reps excel
- 19.2 modems rev up
- DCA's shrewd deals
- Making SQL easy
- Can OA still save $?

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THE MAGAZINE FOR MIS EXECUTIVES
A HAYDEN PUBLICATION

BEYOND STRATEGIC SYSTEMS

Fortune 100 MIS executives' big challenge is building information systems that reach consumers.

It won't be easy.

James Johnson, chief MIS strategist at Equitable Life, foretold the failure of early videotex services, but made sure the carrier's investment in them paid off.

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Cover photo by Ted Hardin

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61 DCA's timely mergers/A savvy acquisitions strategy and a knack for shrewd deals have made Digital Communications Associates a leading vendor of micro-to-mainframe links.

STRATEGIC SYSTEMS

63 Mini makers court business/The three major minicomputer vendors are gunning for more business users. Will their strategies match yours?

Copies printed: 184,300

New chip to soup up micros and minis ... Motorola's new 32-bit 68030 microprocessor, at least twice as powerful as its current 68020 chip, will give performance boosts to users of micros and minis based on Motorola chips. Motorola claims its new chip, which is scheduled for release in mid-1987, is two to four times faster than the new Intel 80386 processor.

The increased performance comes from an on-chip memory management unit and an on-chip data cache added to the 68020's existing instruction cache, as well as a reduction in external access time from three clock cycles to two cycles. With its 20-MHz design, the 68030 will operate at 16 MHz to 30 MHz. □

The "800" club grows ... With MCI Communications Corp.'s announcement of MCI 800 Service, AT&T is no longer the only carrier boasting a toll-free "800" offering. Analysts say other independent carriers are likely to follow MCI's lead in challenging AT&T.

The new MCI 800 Service, scheduled to be available in the first quarter of next year, will be 10 percent to 12 percent cheaper than AT&T's comparable offerings, MCI claims. No tariffs were filed at press time, however.

MCI says it will offer several new features in its service, including flat-rate distance-sensitive pricing, the option to use the same number for in-state and out-of-state callers at no additional charge, volume discounts, call detailing, and dedicated or switched customer connections. □

ADR recognizes DB2 ... In announcing a new strategic direction for its database products, Applied Data Research Inc. (Princeton, NJ) has acknowledged both the emergence of IBM's SQL as the standard data manipulation language and the importance of DB2, IBM's relational database management system.

ADR plans to equip Ideal, its fourth-generation language, with the ability to generate SQL statements that act on DB2. This facility will allow programs written in Ideal to run on DB2 as they would on ADR's own DBMS, Datacom/DB, ADR says. Future versions of other ADR development tools, including Dataquery for ad hoc queries and ADR DL/Cobol, will be able to access DB2, the vendor says. Tangible results of the strategy, revealed at ADR's annual user group meeting, are not expected until the third quarter of next year.

ADR also says it is working toward the next step in SQL support: allowing SQL statements to access Datacom/DB. The vendor did not announce a target date for such a capability, however. □

Who's out first? ... Although Oracle Corp. announced its SQL Star distributed relational database system after archrival Relational Technology Inc. announced its product, Oracle claims it is the first vendor to ship such a product.

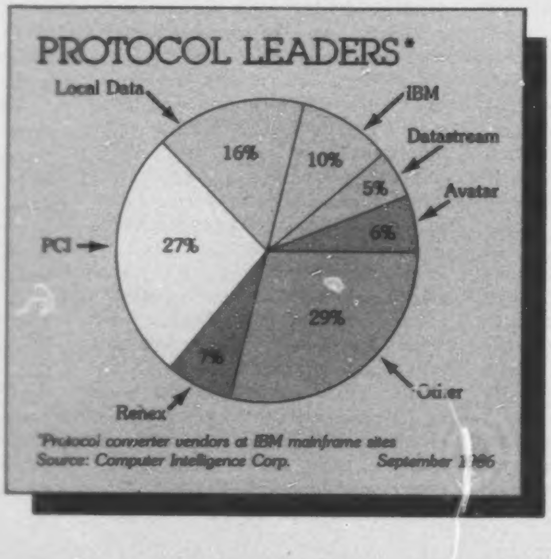
Many features of both vendors' products are still unavailable, however. A fully functional version of the DBMS that Oracle is now shipping will not be available until the third quarter of next year. Relational Technology promises a complete distributed DBMS by 1988.

Lawrence J. Ellison, president of Belmont, CA-based Oracle, claims SQL Star is based on IBM's as yet unreleased distributed DBMS, called R Star. SQL Star features the same syntax and uses the same extensions to SQL that IBM has revealed in technical papers about R Star, Ellison says.

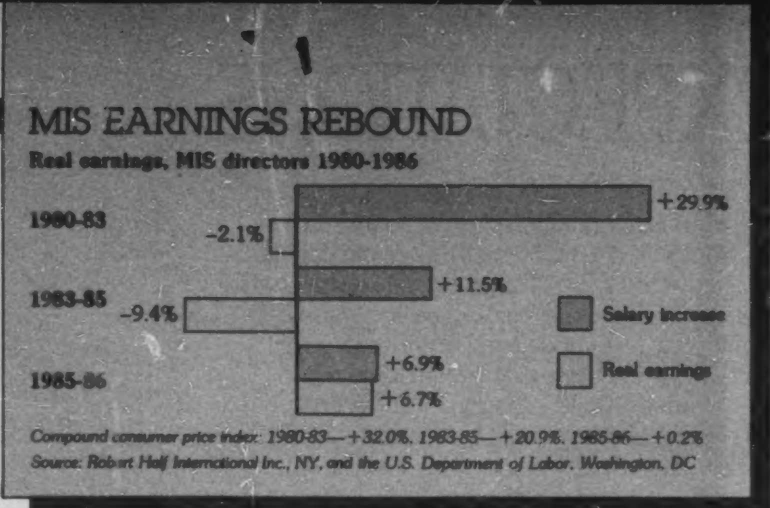
The elements of SQL Star available right now are Version 5.1 of Oracle (free to Oracle users), which provides for multisite queries and distributed directory services, and SQL-Net, which interfaces to networks and provides distributed processing between applications and databases.

Currently, SQL Star users can seamlessly access information from a remote Oracle DBMS and process it at their local hosts. Oracle says that connections to IBM's SQL/DS, DB2, and IMS DBMSs are forthcoming. Also still to come are the abilities to update transactions across the network, replicate data in different databases, and support a single table of data over multiple sites.

Oracle estimates that the components of SQL Star will cost from 25 percent to 50 percent of the basic Oracle licensing fee, which ranges from $1,000 for a micro to $160,000 for a forthcoming version that runs on IBM mainframes under the MVS operating system. □



*Protocol converter vendors at IBM mainframe sites
Source: Computer Intelligence Corp. September 1986



Compound consumer price index: 1980-83—+32.0%. 1983-85—+20.9%. 1985-86—+0.2%

Source: Robert Half International Inc., NY, and the U.S. Department of Labor, Washington, DC

From 1980 to 1985, salary increases given to MIS directors failed to keep pace with the compounded Consumer Price Index, so their real earnings actually fell. The increases caught up in 1986.

the more important aspect from our point of view," says Ed Scharmer, IBM's 3174 product manager. "We're well aware of customer demands for a single terminal to talk to IBM hosts that can also talk to what is often referred to as departmental computers, especially in engineering applications." Moreover, integrating the 3174 in engineering and manufacturing applications will be made easier by the inclusion of a controller interface that allows third-party devices, such as robots or process controllers, to be plugged in. The request for 3274 to ASCII conversion was made by Share, an IBM user group.

This array of features may cause some users to choose the 3174's protocol conversion option over terminal emulation. "It definitely puts a lot of pressure on vendors who were filling that niche before," says Bob Silverstein, a consultant with Network Strategies Inc., Fairfax, VA.

Connecting to non-Blue hosts. IBM already markets several conversion devices, including the 7171 and the 3708. But the key advantage of the 3174 is its ability to integrate this capability into the controller.

Westinghouse Corp.'s marine division in Sunnyvale, CA, which makes submarine gears and related components, is considering the purchase of a 3174 when the protocol conversion option becomes available in the first three months of next year. Westinghouse plans to use the controller to connect 50 to 60 terminals and personal computers to both a Hewlett-Packard 3000 minicomputer running manufacturing applications and an IBM mainframe that runs finance, human resource, and office automation applications. Connection to both hosts is more important than the higher performance provided by terminal emulation boards, says Rob Realini, the division's manager of technology support.

Because of the additional functions available with the 3174, such as the ability to connect to IBM's token-ring network, the division will look closely at the product, says Realini, although some models of the 3174 can't support the token-ring and protocol conversion options simultaneously. The division's IBM representative also indicated that an Ethernet hookup for the device may be forthcoming, although it's still unannounced.

Terminal emulation still strong. Despite these features, the asynchronous adapter for the 3174 won't make the Irma board from Digital Communications Associates Inc. (DCA, Alpharetta, GA) and other terminal emulation products obsolete. For applications such as file transfers that require the Mbit-per-second speeds available over coaxial cabling, terminal emulation products will still be the first choice. If coaxial cabling is already in place, terminal emulation cards will remain the preferable option, says Don Czubek, of Communications Solutions Inc., a software and consulting firm based in San Jose, CA. "But, if all you're interested in is a plain vanilla 3270, then Irmas and the 3174's protocol conversion option are pretty much comparable," says Czubek.

According to one terminal emulation board maker, the pricing and functionality of the 3174 is less attractive than terminal emulation. Each asynchronous emulation module, consisting of software and port adapters serving up to eight micros or ASCII terminals, costs $2,250. Also needed are a second 3174 disk drive ($650) and an asynchronous adapter card for the micro (about $100). If the micro or ASCII terminal is more than 50 feet from the controller, a modem is also required. A 3174 can handle up to three adapters serving up to 24 micros.

DCA officials say that to fully configure a 3174 for the conversion costs more than just the basic software modules. "If you want to buy a full-blown 3174, there's a lot more there than meets the eye," says Jim Ottinger, president of DCA's personal computer communications group. He adds that the $1,195 price for an Irma board is often discounted to as low as $750. "You're not going to get that kind of discounting with IBM," he says.

Ottinger believes that existing customers of DCA's product line will be reluctant to make the switch because the Irma boards have achieved the status of a de facto standard in the marketplace. "To switch means to retrain users and put in new software," he says. The marketplace has deemed protocol conversion less practical than terminal emulation, DCA claims. "If it were as functional, protocol conversion—IBM's and others—would be a much larger business," says Bill Hiller, DCA's director of product marketing.

The Irma board converts the IBM PC into a 3270-type terminal, while protocol conversion takes asynchronous data transmitted from the micro or terminal and converts them to a synchronous or bisynchronous data stream. Because asynchronous communication methods proceed on a character-by-character basis, they are inherently slower than the synchronous communications methods used by 3270-type terminals, which transfer data as blocks of information. In addition, protocol conversion doesn't supply the same terminal-handling capabilities as terminal emulation does, Hiller says. "If you want to sign on once a week to look at just one piece of data, or if you have a bunch of asynchronous terminals, such as DEC VT-100s, then protocol conversion is fine," he says. "But if you're transmitting volumes of graphics data, you wouldn't be able to transmit it at asynchronous speeds." Ilene Goldman, an analyst with International Data Corp., Framingham, MA, agrees. "You can make the case that protocol conversion is a cheaper solution, but it's a cheaper solution that gives you less in terms of micro-to-mainframe links."

IBM's Scharmer agrees that terminal emulation is a better choice when high data-transfer rates are required. "A protocol converter goes through another level of function as opposed to going directly to the heart of the 3174, as 3270-type display devices do," he says.

Given the proper configuration, the speed problem with protocol conversion disappears. For instance, Monsanto Chemical Co., St. Louis, uses IBM's 7171 protocol converter, which is channel-attached to an IBM mainframe. "Compared with Irma cards, file transfer is comparable if not a little faster through the 7171," says John Sivill, a Monsanto technology analyst. Monsanto also uses the DCA product for micro-to-mainframe access at its St. Louis headquarters. But using protocol conversion, in conjunction with the 7171 and a local-area network, provides connections to a wide range of

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OCTOBER 21, 1986

- Financial software: The micro link
- Herman's bulks up
- Dual mini strategies
- Extending SNA
- Picture-perfect DBMS

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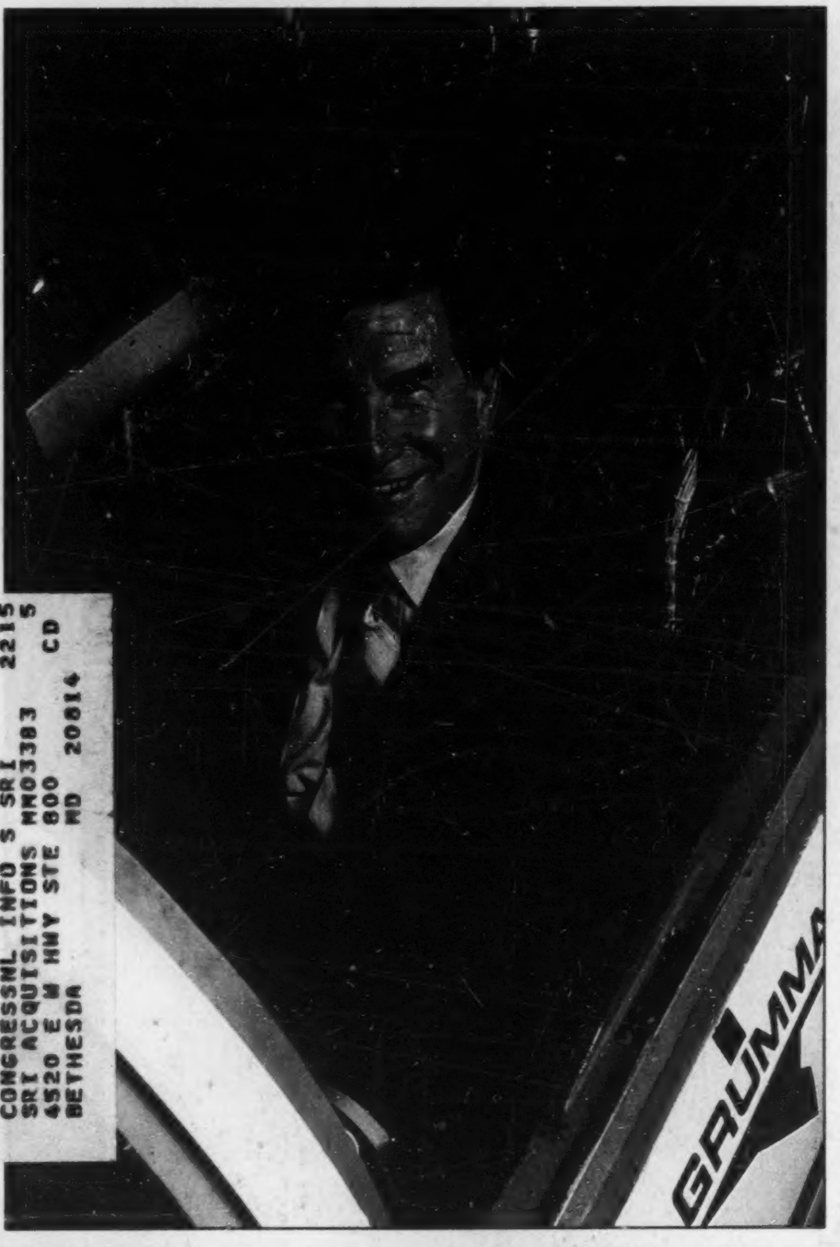

A BIRD'S-EYE VIEW OF MIS

MIS hasn't fulfilled its mission, says Grumman boss John O'Brien. After 3 years at the helm of Grumman Data Systems, he knows why.

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John O'Brien, new president of Grumman Corp. and former president of Grumman Data Systems.

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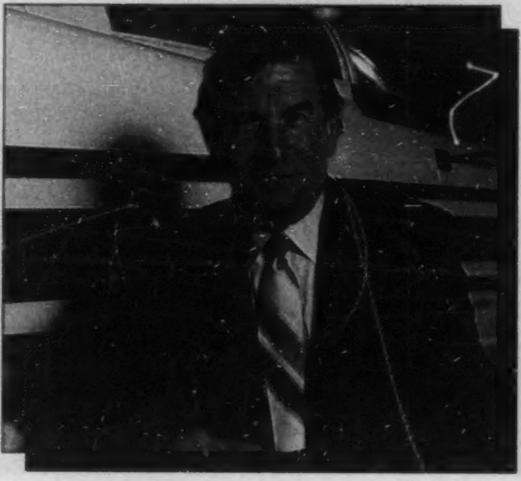
FOLLOWING THE LEADERS

50 Sprint eyes the long run/US Sprint hopes its combined strengths—and extensive fiberoptic network—will make it a power in network services.

CIO

Cover Story



Cover photo by Ted Hardin

36 MIS: A view from the top/Grumman Data Systems became a high flier under John O'Brien, now Grumman Corp. president, but he's not satisfied that MIS is completing its corporate mission.

38 Reaching the peak/"Generalist" John O'Brien sees his main strength as stemming from a variety of management assignments in his 32 years at Grumman.

INSIDE MFG.

64A Pushing MRP into the plants/MRP II on minis

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53 Herman's bulks up/By building an outstanding data center, Herman's got more than a sporting chance to increase its profits.

58 The brains behind Herman's brawn/John Chow created a sound database for a healthy online retailing system. It's so productive other retailers want to buy it.

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61 Modeling duos boost planning/If two heads are better than one, how about 20? Micro versions of mainframe modeling languages and financial applications give users financial planning clout.

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66 Wanted: a good graphics DBMS/When it comes to presentation-quality business graphics, one picture may be worth a million bytes. Therein lies a weighty storage problem for corporate micro users.

Copies printed: 183,519

ROM disk-drive original equipment manufacturers. The extensions will allow users of IBM-compatible micros to access up to 550 Mbytes of a CD ROM disk formatted in the recently issued High Sierra CD ROM file format, which is supported by leading CD ROM vendors. ☐

Big IBM users get more help

IBM, which has been focusing more marketing and support on its largest accounts, announced a restructuring of its marketing operations that the vendor hopes will increase by 50 percent the number of employees serving its 200 largest customers. IBM announced it is redeploying 2,800 employees from its marketing headquarters staff and sending them to branch offices. IBM is combining the Information Systems Group and its North Central and South West marketing divisions into one organization. ☐

Micro parts up for sale

Intelligent Systems Corp. (Norcross, GA), one of the 10 largest vendors in the microcomputer market, is trying to sell its varied businesses. Although the corporation's Princeton Graphics monitor division is successful, its Quadram Corp. board division has lost market share to AST Research Inc. (Irvine, CA), the number-one expansion board maker, says Ed Turville, an analyst with Atlanta-based Johnson, Lane, Space, Smith & Co. All of Intelligent Systems, including graphics terminal maker Intecolor Corp., is up for sale. ☐

Honeywell looks to alliances to cut manufacturing duties

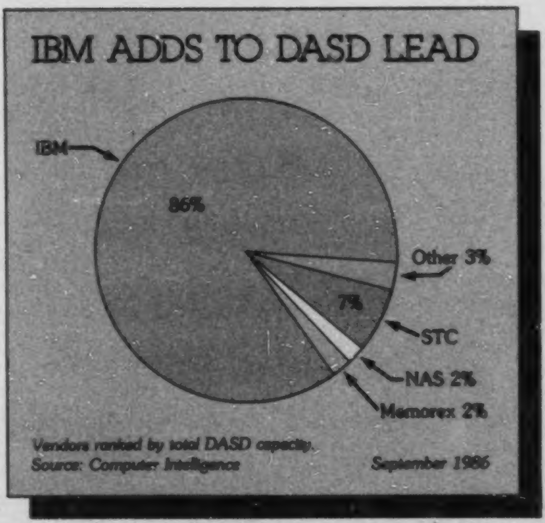
Honeywell Inc. (Minneapolis) announced it is negotiating with its foreign partners in an apparent move to relinquish more of its information systems manufacturing operations to focus on product marketing.

Honeywell says the negotiations center on combining its Information Systems division with France's Bull Group, which makes the DPS 7 minicomputer, and Japan's NEC, which supplies the top-of-the-line DPS 90 and plans a joint supercomputer project with Honeywell.

"Honeywell intends to continue involvement in the computer business as a partner of Bull and NEC," says a vendor spokesperson. Analysts say that Honeywell will become a marketer of computer systems and leave the manufacturing to Bull and NEC. ☐

Wang tightens mini-PBX ties, making data a phone call away

Wang Laboratories Inc. (Lowell, MA) is looking more like integrated voice and data vendors such as Northern Telecom Inc. (Nashville, TN) after tightening office automation links between its VS minicomputers and Business Exchange private branch exchanges. Improvements to the Wang Integrated Office Solution include a $6,000 enhanced module, Speech and Telephony Environment for Programmers, that lets users access mini applications via telephone and receive output via digitized voice. Another module connects Wang's OA software into other PBXs or Centrex switches. ☐



Vendors ranked by total DASD capacity.
Source: Computer Intelligence
September 1986

On the strength of its dual-density 3380 disk drives, IBM increased its share of the IBM/PCM disk-drive market from 81 percent in 1985 to 86 percent this year. Storage Technology Corp. dropped 3 percent, Memorex Corp. dropped 1 percent, and National Advanced Systems Inc. gained 1 percent from last year.

ADR's Goetz steps aside

Analysts say the move by Martin Goetz, a founder and technological leader of Applied Data Research Inc., to step aside as president could be a voluntary return by Goetz to his natural milieu or a push by ADR's parent corporation, Chicago-based Bell Regional Ameritech Inc., to gain greater financial control.

According to Princeton, NJ-based ADR, Goetz (pictured) asked to be reassigned to a role in technical development and will assume the title of senior vice president and technology officer. Goetz's appointment as ADR's president in 1984 preceded by only two years the vendor's acquisition by Ameritech. His replacement as president, Dennis Strigl, comes from another Ameritech subsidiary.

Says one Wall Street analyst who follows ADR closely, Goetz is likely to feel more comfortable dealing with technical rather than managerial concerns. The analyst also thinks, however, that ADR has been losing money due to the success of IBM's DB2 relational database management system. ☐

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OCTOBER 28, 1986

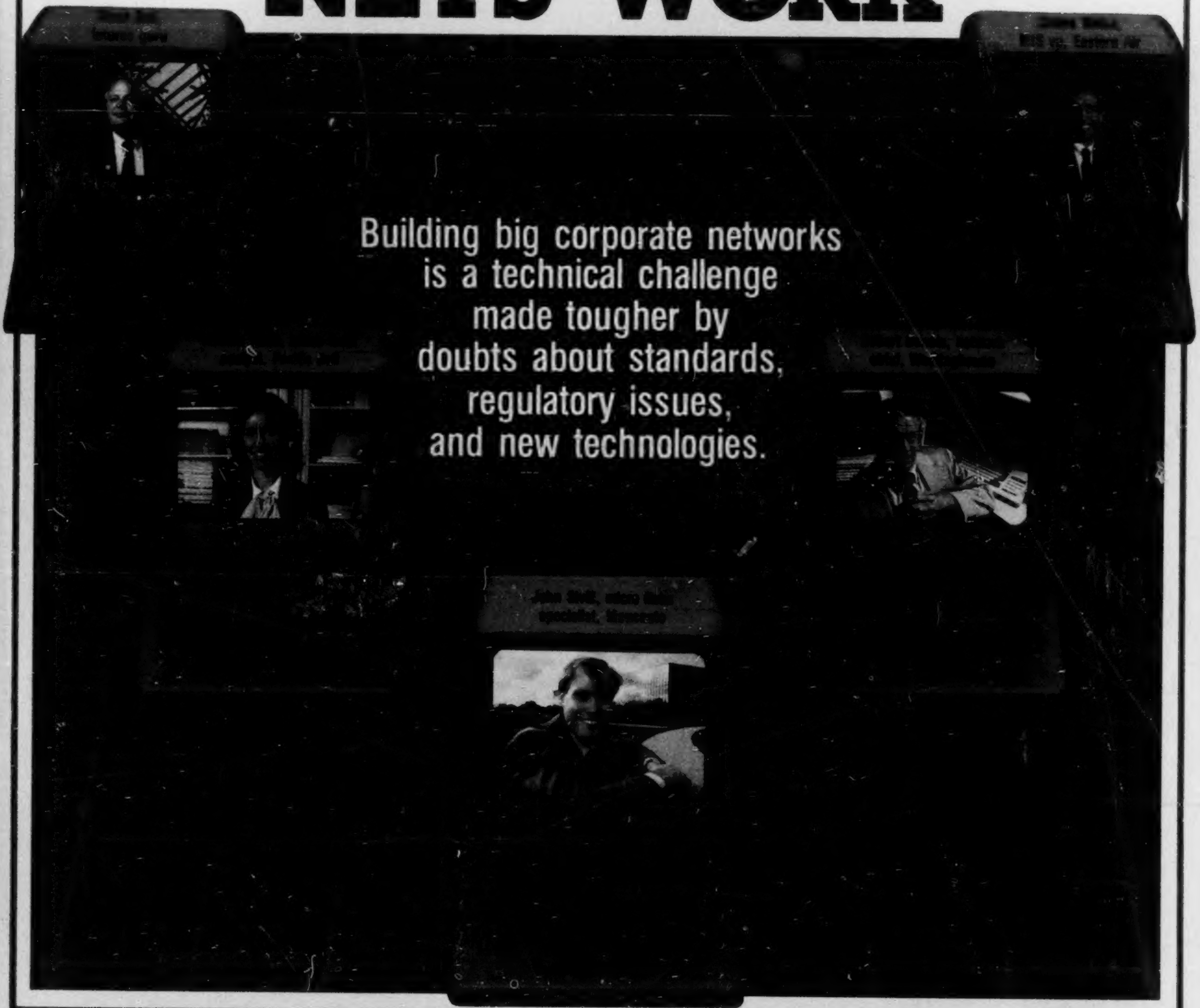
SPECIAL ISSUE

COMPUTER Decisions®

THE MAGAZINE FOR MIS EXECUTIVES

A HAYDEN PUBLICATION

MIS: MAKE NETS WORK



Building big corporate networks
is a technical challenge
made tougher by
doubts about standards,
regulatory issues,
and new technologies.

October 28, 1986

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Cover photo: Freeze Frame

Copies printed: 178,019

COMMUNICATIONS

COSTS RISE WITH NO RELIEF IN SIGHT

At first glance, the laws of supply and demand would seem to have gone awry in corporate communications. Despite a big increase in the number of long-distance carriers and communications equipment suppliers, budgets keep rising.

Usually, greater supply increases competition, thereby reducing costs. However, a survey by the Dallas-based International Communications Associates of its 600 members reveals that corporate spending on communications is rising. Corporations in nine of the 17 industry classifications reported higher expenditures, as a percentage of revenues and operating expenses, last year than in 1984. The ICA's membership is a good bellwether for corporate trends: Its members must be users, not providers, of communications products and services, and must have annual phone bills of at least $1 million.

Analysts and consultants believe communications spending is rising for four reasons:

- Access charges have been imposed on all phone customers.
- The cost of local channels is rising.
- The cost of private lines, including installation, has risen, hiking the cost of private networks.
- The falling prices of communications gear like multiplexers, PBXs, and modems have been more than offset by heavy corporate spending in networking and communications.

The top spenders in terms of operating expenses all have seen dramatic growth in their communications budgets. Retailers, for example, saw communications expenses as a percentage of operating costs accelerate by 480 percent from 1984 to 1986. Banks, nonprofit institutions, and service industries also saw high-flying growth. Each of these industries typically uses communications links to tie together decentralized operations.

Are such cost increases inevitable? No, say several consultants. "For MIS executives, the news on overall costs since the AT&T divestiture has been bad, and it's likely to get worse," says Robert Ellis, president of the Aries Group, a Rockville,

CORPORATE PHONE BILL—VIEW #1

Communications spending as % of total revenues

Rank 1985	Rank 1984	Industry	1985 % Revenues	1984 % Revenues
1	3	Office equipment/Computers	1.35	2.19
2	*	Transportation/Trucking	1.10	*
3	2	Financial services	1.00	2.34
4	*	Instruments	0.93	*
5	5	Electrical/Electronics	0.92	1.26
6	14	General services	0.91	0.63
7	17	Retailing (nonfood)	0.87	0.49
8	8	Publishing/Broadcasting	0.70	0.98
9	12	Manufacturing	0.67	0.77
10	*	Oil service & supply	0.64	*
11	16	Chemicals	0.60	0.51
12	15	Tire & rubber	0.59	0.55
13	22	Drugs	0.58	0.30
14	19	Special machinery	0.49	0.41
15	13	Aerospace	0.42	0.76
16	*	Metals & mining	0.34	*
17	*	Paper & forest products	0.33	*
18	*	Steel	0.30	*
19	20	Food processing	0.29	0.40
20	24	Automotive	0.21	0.21
21	*	Natural resources	0.20	*
21	21	Utilities	0.20	0.31
23	21	Beverages	0.13	0.31

** No data in survey due to change in industry classification.*
Total revenues reported: $494,686,580,000. Total communications spending: $2,669,220,000.
Data based on responses from 138 ICA member companies.
Source: International Communications Assoc.

CORPORATE PHONE BILL—VIEW #2

Communications spending as % of operating costs

Rank 1985	Rank 1984	Industry	1985 % Expense	1984 % Expense
1	18	Retailing (nonfood)	3.02	0.52
2	7	Banks	2.33	1.29
3	3	Office equipment/Computers	1.55	2.53
4	2	Financial services	1.38	2.66
5	12	Universities/Nonprofits	1.30	0.93
6	*	Instruments	1.22	*
7	*	Transportation/Trucking	1.16	*
8	6	Electrical/Electronics	1.11	1.41
9	15	General services	1.05	0.68
10	13	Manufacturing	0.81	0.85
11	9	Publishing/Broadcasting	0.80	1.19
12	*	Oil service & supply	0.73	*
13	24	Drugs	0.68	0.36
14	21	Chemicals	0.62	0.43
15	16	Tire & rubber	0.59	0.57
16	23	Special machinery	0.54	0.40
17	14	Aerospace	0.45	0.80
18	*	Paper & forest products	0.45	*
19	22	Food processing	0.43	0.42
20	*	Metals & mining	0.34	*
21	*	Steel	0.29	*
22	*	Automotive	0.23	*
23	24	Utilities	0.22	0.36
24	*	Natural resources	0.21	*
25	25	Beverages	0.15	0.35

** No data in survey due to changes in industry classifications.*
Total communications spending reported: $3,313,618,000. Total operating expenses reported: $472,522,901,000.
Data based on responses from 140 ICA member companies.
Source: International Communications Assoc.

> "It doesn't matter which carrier you choose if your rate per unit is made higher by splitting your load between three carriers."

MD, rate and tariff consultancy. "Their costs are rising because they're stuck on private lines. The cost of the typical multidrop data circuit used in corporate networks has gone up."

These cost increases are evident in the bread-and-butter of corporate networks: multidrop private lines connecting sites in the same region. For example, the cost of a circuit connecting a data center in Philadelphia with three terminals in Rockville, MD, and five in nearby Gaithersburg, MD, has risen by 40 percent since divestiture, to about $1,300 per month.

By contrast, WATS, direct-dial, and long-haul private lines have fallen in cost. The reason: competition. "Any vendor that can rent a WATS line and a circuit switch is trying to become a reseller of direct-dial services," says Ellis. "Satellite carriers offer competition in long-haul private lines, but in multidrop lines, AT&T is still the only provider."

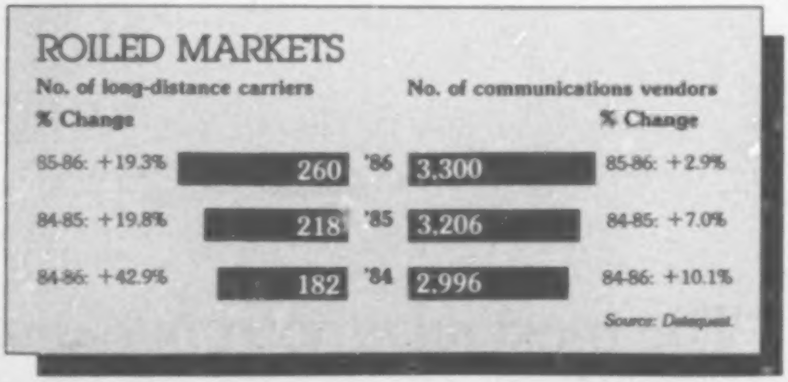
There are alternatives in data transport, which typically accounts for 30 percent of communications implementation and operating costs, says Joaquin Gonzalez, networking strategies analyst at the Gartner Group consultancy, Stamford, CT. However, reliance on private lines remains high, keeping costs high.

Carriers, notes Gonzalez, have a strategic interest in maintaining high private-line rates. "The golden rule for carriers is that private lines for data are inflexible," he says. "Businesses are locked into data communication architectures that require private lines."

Robert Ellis cautions that a wider choice of alternatives is not necessarily better if it leads to confusion. "In voice communications, managers are confronted by many strange choices, but the key to business is preserving economies of scale in dealing with a carrier," says Ellis. "It doesn't matter which carrier you choose if your rate per unit is made higher by splitting your load between three carriers. You might be better off giving it all to one carrier."

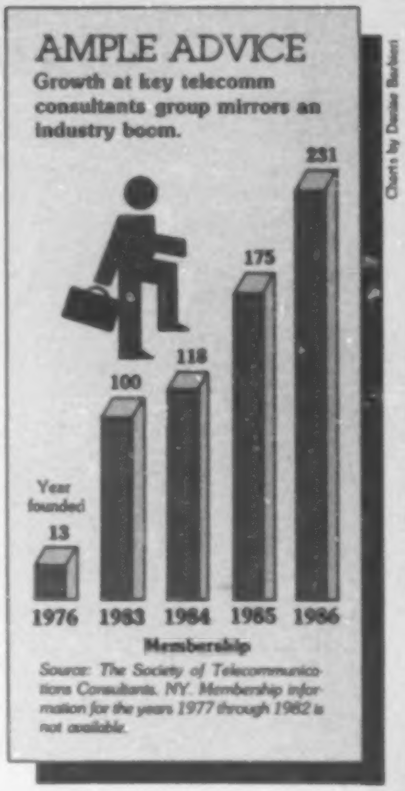
Gonzalez, however, says confusion is inevitable. MIS and communications executives have more experience in evaluating and selecting equipment like muxes and modems, and network software like protocols, than in selecting transmission services. There's a lot of on-the-job learning going on, he says. "How would you have gained any schooling in the options if you never had to worry about transmission alternatives?" he asks.

The way out for MIS executives is moving data transport off private lines, says Gonzalez, either by bypassing local exchange carriers or by redesigning their networks. The most commonly used alternatives, he says, are very small aperture satellites, microwaves, and public data networks. These alternatives can be difficult to implement, and some are expensive. Gonzalez, however, believes they are worthy of consideration. "If MIS executives don't, they'll continue to get raked on private lines," he says. —*Brian Shannon*



ROILED MARKETS

Source: Dataquest.



AMPLE ADVICE

Growth at key telecomm consultants group mirrors an industry boom.

Source: The Society of Telecommunications Consultants, NY. Membership information for the years 1977 through 1982 is not available.

Charts by Denise Barbieri

CONSULTANTS ADVISE AND CONSULT

You've probably had to chase them away from your door. Membership in the Society of Telecommunications Consultants indicates that this is one hot career.

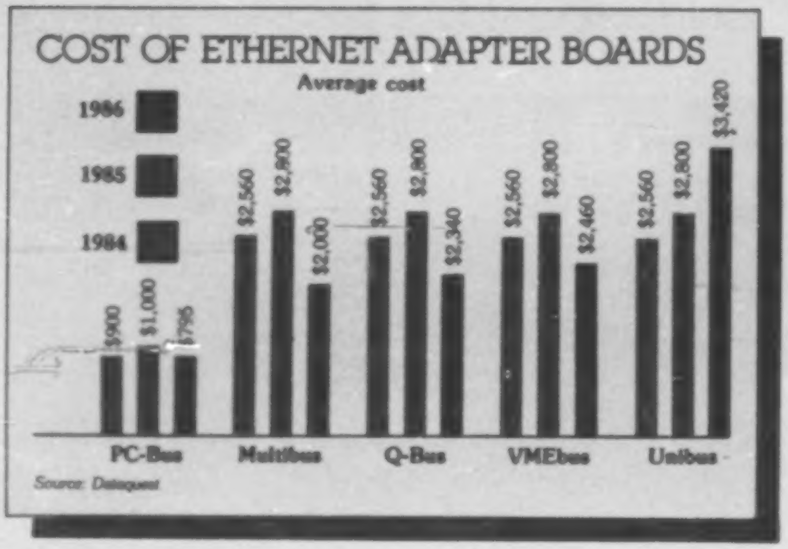
The society doesn't claim to represent every consultant advising corporations on networks and communications. But its membership roles are a fair barometer of the number of consultants vying for your business. The society began with 13 members. It now has about 231, and projects the total number of consultants at 1,400.

Gordon Gordetsky, vice president of the society's public relations committee, estimates that 20 percent more consultants enter the business every year. Why? Opportunity is calling. The industry itself has expanded during this decade. Private corporate networks have grown dramatically during the same period, says Gordetsky. Also, many of the telecommunications systems installed during the 1970s have been replaced during the last few years. It all adds up to a tremendous demand for consulting services.

Surprisingly, Gordetsky does not believe the Bell System breakup had a particularly significant effect on the demand for consultant services. The society had a brief burst of new members between mid-1984 and mid-1985, he says, but high growth rates had already been established.

The society's 231 members are full-time consultants, and they work for 150 firms employing a total of about 650 consultants, says Gordetsky. To become a member, applicants must have a year of experi-

(Continued on page 14)


COST OF ETHERNET ADAPTER BOARDS

Source: Dataquest

high of 21.9 percent for Multibus boards to a low of 3.9 percent for VMEbus boards since 1984. However, Unibus board costs have risen dramatically during the same period—by 33.6 percent. Unibus is at the heart of DEC's VAX line, which has been ringing up big sales this and last year. Brad Baldwin, a Dataquest analyst, says prices for other Ethernet adapter boards could rise if the demand for their buses changes.

Baldwin expects prices to decline across the board during the next several years—possibly by as much as $500. The reason will be cheaper components. After that, Baldwin expects prices to rise. "Prices will bottom out, possibly in two years, and then start moving up again," he says.

—Brian Shannon

LOCAL-AREA NETWORKS

LANS: GROWING, GROWING, AND GONE

The number of local-area networks in corporations is growing rapidly. Evidence of the trend is the 200 percent increase in the number of LAN connections since 1984.

The increase, reported by Dataquest, a San Jose, CA, market research firm, covers all LANs, not just those that link microcomputers. Dataquest also reports that shipments of LANs, as measured by connections, are up by 120 percent since 1984.

LANs are catching on for two reasons, say analysts: More corporations are setting up links between mainframe databases and users at smaller computers, and networks allow users to share expensive peripherals. The most important need LANs serve, says Eric Arnum, analyst at International Resource Development Inc., Norwalk, CT, is document transfer. LANs are starting to replace the traditional "sneakernet"—users running back and forth between workstations with floppy disks, he says.

Corporations are also striving to get the most efficient use possible from their peripherals, says Arnum. Rather than allow users to equip themselves with laser printers, for example, corporations are providing the means for groups of users to share printers.

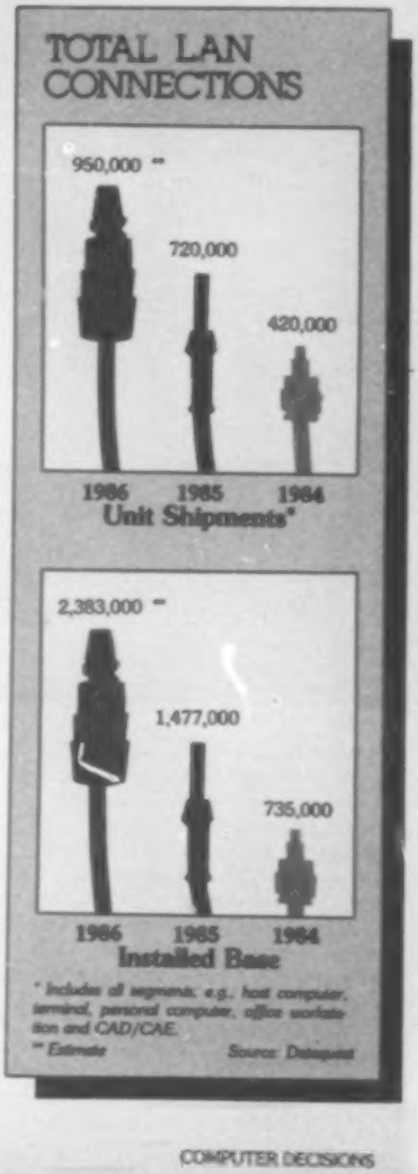
Brad Baldwin, an analyst at Dataquest, says the increasing number of LANs in corporations reflects a growing concern that users have the access they need to larger systems. "Sure, all the standard efficiency issues apply to LANs," he says. "But printers, hard disks, and other peripherals are becoming generally less expensive." The more important issue, he says, is that LANs offer an efficient means to connect micro users to mainframes. All the major hardware vendors offer gateway products providing such access, he says.

LAN installations in corporations would probably proceed apace; except for the problem of "wall-bashing," says Arnum. An LAN that costs from $695 to $1,000 per connection might easily demand an equal amount in construction work for rewiring, he says.

The growth in PBX installations has been much slower than the growth of LANs, according to Northern Business Information, New York. Users have been spending about 3 percent more each year on PBXs, a paltry growth rate.

Arnum says PBX installations have slowed for three reasons. First, LANs are preferred for many connectivity functions that might once have been dedicated to

LANs offer an efficient means to connect micro users to mainframes.


TOTAL LAN CONNECTIONS

* Includes all segments; e.g., host computer, terminal, personal computer, office workstation and CAD/CAE.

** Estimate

Source: Dataquest

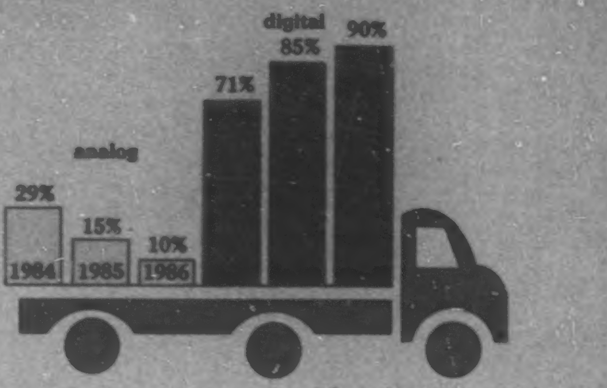
PBXs. LANs are much faster than PBXs for data transfer. Second, only two years ago, LANs were in their infancy. Corporations are now buying LANs at a booming rate. Third, the boom for PBXs has already passed.

Although PBX line shipments have not been expanding rapidly, a significant shift toward digital PBXs is evident. According to Northern Business Information, 29 percent of the PBX lines shipped in 1984 were analog.

Some analysts interpret these statistics to mean that the volume of data communications in corporations is growing. Others are skeptical. Joaquin Gonzalez, networking analyst at the Gartner Group, Stamford, CT, believes many corporations have purchased digital PBXs only to continue to use them mostly for voice communications. Only 5 percent to 10 percent of the PBX lines in major corporations are transporting data, he says. *—Brian Shannon*

PBX LINE SHIPMENT

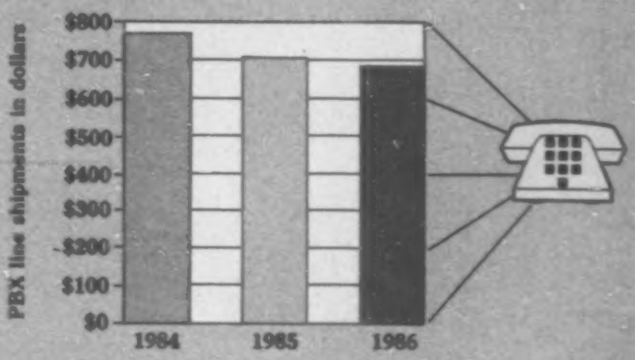
Digital vs. analog



Source: Northern Business Information.

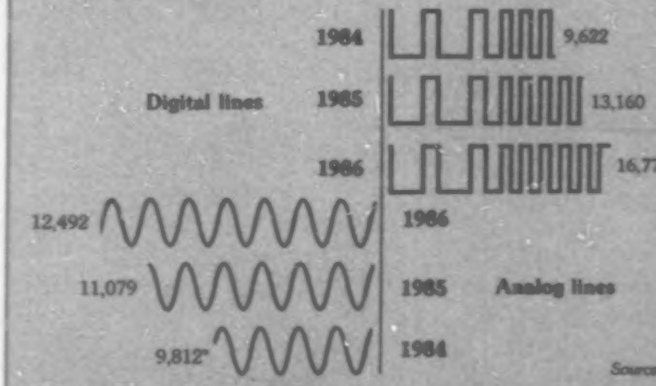
PBX RETAIL PRICE PER LINE

U.S. market, 1984-86



Source: Northern Business Information.

DIGITAL PBXs RISE



Source: Dataquest.
**Add 000.*

STANDARD LINKS

RIDING THE TELE-COASTER

When can MIS and communications executives expect to see the AT&T divestiture's promised lower business phone costs? The cost of Direct Distance Dialing and WATS have fallen as competition increased and some of the old cross-service subsidies of the Bell System have been eliminated. Yet most corporate budgets are rising.

The situation is described as a rollercoaster by Ralph Putman, tariff specialist for Telco Research Corp., Nashville, TN, market researchers. Some prices go up, others go down, and the result is unsettling.

A key factor in the pricing trends is access line and subscriber line charges. For example, the cost of a four-minute call during business hours from New York to Los Angeles has dropped 26.2 percent for AT&T customers since 1983. MCI's customers have enjoyed an 11.6 percent rate reduction for the same call during the same period. These savings, however, are offset by subscriber line charges, says Robert Ellis, president of the Aries Group, a Rockville, MD, consultancy.

The subscriber line charges set by the Federal Communications Commission require businesses to pay $3 per line per month for Centrex connections and $2.50 to $6 per line per month for PBX lines. At the same time, charges for access lines—the lines connecting the phone company's local switch to customers' buildings—have risen from $36.50 to $50.50 since January 1984, a 38.4 percent increase.

Ellis expects the Federal Communications Commission to change its access charge scheme by shifting the balance between charges paid by consumers and businesses more in favor of businesses. (See "A muddled tele-future," page 28.) The result, he says, will be rate reductions

(Continued on page 20)

← CIRCLE 10

(Continued from page 20)

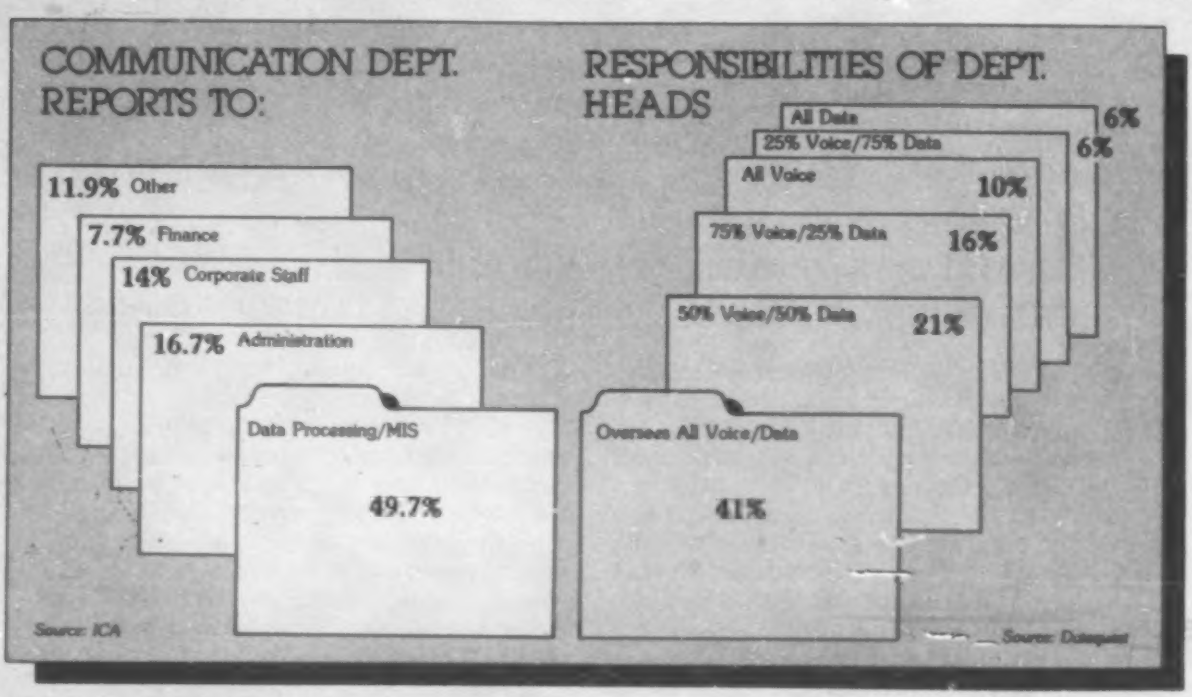
MANAGEMENT PROFILE

MANAGERS' STATS

The two charts on this page cover four key areas concerning communications managers: which departments they report to; their job responsibilities; their education; and their work experience.

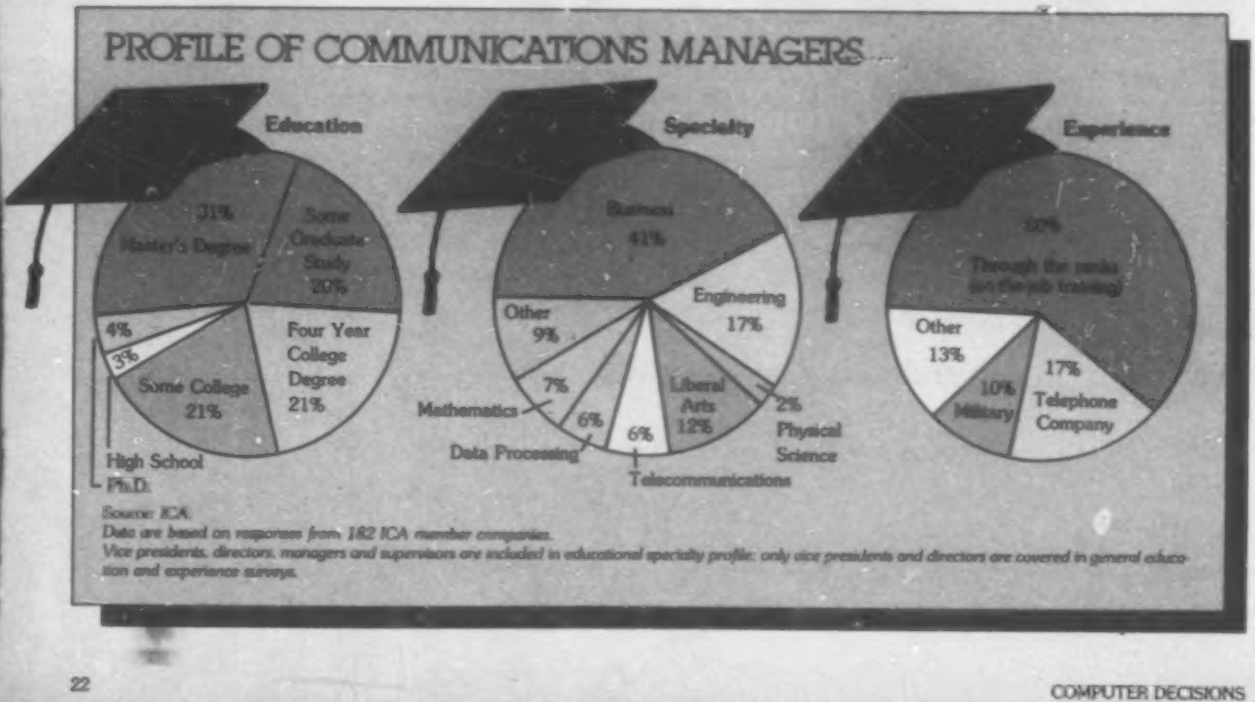
The left half of the top chart confirms that MIS/dp and communications departments are forging closer ties, and that the communications function is rising in visibility and importance in most organizations. The right half shows that telecomm managers still devote most of their time to managing voice communications.

The first pie in the bottom chart shows, in part, that 97 percent of the survey participants have some college education and 35 percent have post-graduate degrees. The second pie outlines various educational specialties, with business as the largest component. The third pie indicates that most managers rose through the ranks in their organizations. —*Brian Shannon*



Source: ICA

Source: Dataquest



Source: ICA.
Data are based on responses from 182 ICA member companies.
Vice presidents, directors, managers and supervisors are included in educational specialty profile; only vice presidents and directors are covered in general education and experience surveys.